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ABSTRACT

Noise-related training programs were reviewed in nine degree-granting institutions in seven states. These programs represent a sample, only, of the various programs available nationwide. The enrollment profile and average number of graduates by degree level for the past three years are given, as well as the apparent enrollment trends by degree over the past three years. The noise programs which are described in the profile are served by a total of 69 full-time and 88 part-time faculty. Information is given on the curricula and sources of research funds and student financial support. A national noise employment profile is also presented. (BB)

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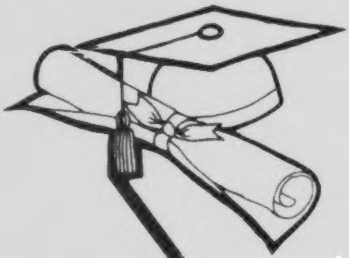

Post Secondary Education Profile

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
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NOISE

Phase II
Of A National Environmental/Energy Workforce Assessment

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC.
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SE 025 202

7

NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT

PHASE II

POST-SECONDARY EDUCATION PROFILE

NOISE

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC.

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

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INTRODUCTORY NOTE

The National Environmental/Energy Workforce Assessment: Post-Secondary Education Profile was conducted by National Field Research Center, Inc. with main offices in Iowa City, Iowa. The following personnel have had primary responsibility for the development of the project report.

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Sincere appreciation is expressed to those persons within the United States Environmental Protection Agency, Office of Federal Activities, who provided guidance and direction throughout the term of the project: Mr. J. Donald Cook, Project officer; Mr. Joseph McCabe, and Mr. Michael Moore.

Gratitude must be expressed to the many individuals and organizations from the private sector who were most generous in their contribution to this project. Their openness and responsiveness reflect their concern regarding the training of our environmental workforce and their critical role in that effort.

REVIEW COMMITTEE

A special word of acknowledgement is extended to the following people who graciously gave of their time, knowledge and experience in order to review and comment on the information included in this volume. The efforts of this national committee were particularly insightful, and in general have been incorporated into the final report.

It must be pointed out that in all cases the individuals acknowledged below were asked only to review and comment on the material contained in the volume and to express their views regarding the representativeness of the material presented. They were not asked to endorse either the volume or the study in general, and the inclusion of their name on this list should not be considered an endorsement since such was not the intent.

In light of numerous responsibilities, it is especially important to note that these persons responded within very strict time constraints. Such a pattern reflects positively on both the individuals and the institutions and organizations which they represent.

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FOREWORD

Information for this report was largely compiled from on-site interviews with professionals in post-secondary institutions throughout the United States. On-site interviews were supplemented by telephone and/or mail contact to clarify and revalidate the data. This report presents a summary of programs in junior colleges, vocational/technical training institutes, community colleges, four-year colleges, and universities as well as other training institutions. Programs are representative of all levels from academic certification through doctoral degrees. The environmental pollution control areas of air, noise, pesticides, potable water, radiation, solid waste, wastewater and energy were surveyed.

This study was conducted for the United States Environmental Protection Agency by the National Field Research Center, Inc. of Iowa City, Iowa, with field offices located in Atlanta, Georgia; Denver, Colorado; and Washington, D.C.

NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT

PHASE II

POST-SECONDARY EDUCATION PROFILE

NOISE
SUMMARY

NOISE

A. STATES, INSTITUTIONS, PROGRAMS AND DEGREES

Noise related training programs were reviewed in nine degree-granting institutions in seven states. Only one of these offers the option for pursuing a bachelor's degree. One program in acoustical engineering offers the opportunity for students to complete one of several traditional engineering degrees, while taking courses which have direct application to acoustical engineering. The remaining seven programs offer advanced degrees, all but one at both the master's and doctoral levels.

Six of the programs are conducted by engineering disciplines, with one other being from an engineering perspective, but through a non-engineering department. One program in industrial audiology is starting this year, and is one of the two audiology programs surveyed. Two other programs which do not offer academic degrees are also included in the profile.

The following table illustrates the geographic spread of the degree-granting programs reviewed for this profile.

STATES, PROGRAMS, DEGREES

Degree	Number of Programs	States
Bachelors	1	OH
Masters	8	MA, NC, OH, PA, TN, VA
Doctoral	7	MA, NC, OH, PA, TN, VA
Certificate (Advanced)	1	GA
TOTAL	9	7

B. ENROLLMENT STATISTICS AND GRADUATES

Only one of the noise programs surveyed for Phase II reported no need for formalized recruitment. The remainder of them advertise in a variety of ways, most commonly employed is the distritution of descriptive materials (e.g., brochures, posters, etc.) on campus as well as in other institutions. Other methods of student recruitment include distributing program requirements among related majors' students, faculty members' visits to other institutions, and maintaining high visibility at national meetings and conferences.

The following table depicts the enrollment profile and average number of graduates by degree level for the past three years. Also summarized in this table are the apparent enrollment trends by degree, over the past three years.

NOISE ENROLLMENT PROFILE SUMMARY*

Degree	Enrollment Full-time	Enrollment Part-time	Graduates Average # Per Year	Enrollment Change By Program Up	Down	Stable
Bachelors	30		30	1		
Masters	84	17	38	3		6
Doctoral	50	7	13	3		4
TOTAL	164	24	81	7		10

*The reader should be aware that neither the University of Tennessee's Industrial Audiology program, nor the Georgia Institute of Technology's Acoustical Engineering program were able to provide enrollment data. In addition, each degree level is recorded as one response in the enrollment trend.

Statistics show that in-state enrollment figures predominate, ranging from 60 to 80 percent attendance from within the state. While the percentage of women enrolled varies from one institution to another, the average is around 15 percent for these programs.

C. FACULTY

Noise programs which are described in the profile are served by a total of sixty-nine full-time faculty and eighty-eight part-time faculty. These faculty have varying levels of interaction with those programs which are classified as noise-related, and many of those which have been called part-time may have full-time status in another department. Responsibilities vary among administration, research, and teaching.

D. CURRICULA

Six of the programs surveyed are associated with, or located within engineering departments (in several cases, these departments cooperate with various non-engineering departments in offering the programs). A seventh program is housed in a department of industrial environmental health sciences, but offers a strong engineering emphasis. All of these programs focus on acoustics, noise and vibration control. The remaining two programs offer degrees in audiology, one specifically in industrial audiology. The two non-degree granting programs summarized in the profile include one, by the University of Tennessee Center for Health Sciences, which offers courses in audiometric orientation for industrial hearing conservationists. The second consists of a number of courses specific to noise which are offered by a state agency, the Florida Department of Environmental Regulation.

Four of the degree programs include an applied study term as an integral part of the curriculum. Two of these are audiology programs which require a clinical practicum as a part of clinical certification (ASHA) requirements. The emerging University of Tennessee Industrial Audiology program will require students to complete a portion of the practicum in an industrial setting. The Pennsylvania State University and George Washington University also offer their students applied study opportunities.

It was believed that by finding out the time frame for making changes in a course and in a program (see TERMINOLOGY), a useful reference with regard to procedural, administrative, and developmental constraints would result. In most of the cases where respondents were able to affix a figure to such changes, it was found that a course can be changed in from less than one month's time to one year's time. A program change requires a more complex procedure, and while over half of those who were able to respond report similar time frames as for course changes, nearly as many report that program changes require between one to two years to effect.

Curriculum materials which were felt to be lacking include texts in both acoustics and audiology, a "good acoustics textbook", for example. Emphasized also was the need for a thorough treatment of noise control engineering.

E. RESEARCH FUNDING AND SOURCES OF STUDENT FINANCIAL SUPPORT

Research assistantships are by far the most widely utilized form of financial aid to graduate students. Funding is often channeled through the respective Graduate Schools, or an established noise-related center research body. One official reports that Ph.D. candidates are occasionally employed as research associates. Most programs offer a limited number of scholarships, which are awarded on a competitive basis. Several sources feel that while they have no knowledge of federal training grant monies for any level of student, there is a need and justification for these monies.

Research funding comes from grants and contracts from both public and private organizations. Federal agencies most often mentioned as providing support are the U.S. Navy, the Occupational Safety and Health Administration - NIOSH, the National Aeronautics and Space Administration, the U.S. Army, the Department of Transportation, and the National Science Foundation. Private industries which have provided support include Allied Chemical Company, Tennessee Eastman Kodak, Kingsport Press, Arcada National Press, Mead Johnson, Pease Company, General Electric Corporation, and Burlington Industries.

F. EMPLOYMENT

The following table provides employment data, describing the workforce entry positions of graduates of these programs. The categories are broadly defined as 'industry', 'consulting', 'combined', 'government', and 'other'. 'Combined' refers to those figures which when provided to researchers could not be broken down into the categories of 'industry' or 'consulting'. Figures were provided by faculty members, and were either taken from actual follow-up study data or were "best estimates".

NOISE EMPLOYMENT PROFILE - NATIONAL

Degree	Private Sector			Total Private	Government	Other
	Industry	Consulting	Combined			
Bachelor	75%	10%	-	85%	10%	5%
Masters	16%	4%	32%	52%	40%	8%
Doctoral	15%	5%	29%	49%	33%	18%

A list of occupational titles was sent to contact persons which requested that they correlate the appropriate title with the qualifications of their graduates (with specific notation of academic level). The occupations most often cited were:

Degree Level	Occupational Titles
Bachelor	Acoustical Engineer Noise Control Specialist Industrial Engineer
Masters	Industrial Audiologist* Noise and Vibration Control Engineer Noise Control Consultant Occupational Hearing Conservationist*
Doctoral	Acoustical Physicist

*Applicable to both the masters and doctoral levels.

PROJECT BACKGROUND

Photo reprinted from the University of Wisconsin, Madison Oceanography and Limnology Catalog

PROJECT BACKGROUND

OVERVIEW:

In late 1975, Congress acknowledged the growing national concern for the preservation and conservation of our national resources with a direct inquiry into the availability and readiness of our environmental workforce. That inquiry has taken the form of a three-year, three-phase National Environmental/Energy Workforce Assessment, currently being conducted by National Field Research Center under the direction of the U.S. Environmental Protection Agency. In keeping with the objective of the assessment, this three-phase national effort directs itself at environmental/energy workforce needs, national educational preparedness, and the functional relationship between the two.

PHASE I:

Phase I of the National Environmental/Energy Workforce Assessment focused upon the development of "workforce demand projections" through 1982 for all public environmental agencies. This on-site assessment, which was carried out in all 50 states, Puerto Rico and the Virgin Islands, culminated in a numerical profile of the growth patterns and workforce needs at the national and state levels. Stratification of the overall definition of "environmental occupation" into seven distinct vocational areas enhanced even further the applicability of the results. In addition to this public sector workforce assessment, Phase I included an overview analysis of private sector needs (through an adjunct mail survey of selected businesses and industries) and a brief review of selected environmental educational programs.

Phase I was completed in May, 1977. The 70-volume final report included:

* National Abstract	(1)
* National Legislation	(1)
* Regional Assessments	(10)
* State Assessments (including D.C., VI and PR)	(53)
* Business and Industry Assessment	(1)
* National Summary	(4)

PHASE II:

Phase II of the National Environmental/Energy Workforce Assessment was structured around an intensive on-site inventory of representative environmental educational offerings on a national scale. The primary objective of this project has been to collect and aggregate data on training and educational programs in both the post-secondary education field and in the private sector and to do so by environmental area. Specifically, the study was designed to provide an overview of environmentally related post-secondary education programs, their program structure, representative course offerings, employment history of the graduates, and the faculty structure. Additionally, information was to be collected on program requirements and program projections.

Initially, opportunities to nominate programs for inclusion in this on-site review process was given to the Environmental Protection Agency and its program officers and regional personnel both through the

Project Officer and via direct mail requests; all state departments of education; state environmental agencies and selected media-specific associations. These nominations were supplemented by a direct review of institutional catalogs, information obtained during the first year's on-site activities, and a review of other published sources of information regarding degree programs in environmental areas. These sources are included in Appendix III - Selected Bibliography.

Following their initial development, the lists of nominees were forwarded to the program officers for suggestions regarding additions or deletions. Next, letters were written to those nominated institutions seeking their support and cooperation in the on-site review process. Several programs, some of which were highly recommended, declined the opportunity to participate giving reasons varying from lack of time to the fact that the program being inquired about no longer existed, to outright refusal to cooperate with any government study. These institutions were deleted from the final on-site process. The remainder were included in the study and are shown in Table 1 of each volume. Selection of the sample for the private sector is discussed in depth in that particular volume.

In preparation for the on-site interviews, appropriate persons were contacted in the institution involved and were given a background description of the study, a suggested timetable for the interview process and were told what kind of information was being sought. This was all done in an effort to keep the time involvement of the individual contact persons at a minimum. During the actual on-site interview, generally lasting around one hour, the information was collected, questions asked and answered, and further informational contacts identified. Following this process, each on-site interview was written up in the form of a Training Program Summary, which where time allowed, was returned to the contact person for critiquing prior to inclusion in the report.

Throughout this process, individuals and institutions were given assurance that this study was not an attempt to evaluate program offerings and every attempt has been made on the part of the writers to live up to this assurance. Inclusion in this report provides no assurances of quality, nor should a program's exclusion be consideration of the lack thereof. In many instances certain programs within an institution were not included while others were, primarily due to the determination of the sample - previously discussed. This too should not be viewed in any qualitative manner.

REPORT ORGANIZATION:

The final report, of which this volume is a part, consists of volumes depicting a training profile in each medium under consideration, namely,

Air
Energy
Noise
Pesticides
Potable Water
Radiation
Solid Waste
Wastewater
Composite
Business and Industry and Trade Associations

At the outset it should be pointed out that there are very few degree programs conveying degrees in a particular medium; rather, degrees are offered in various specialties which lend themselves to obtaining employment in one or more of these fields. Nonetheless, to obtain maximum utility for the funding agency, programs were reported in this fashion. The Composite section was necessitated by the number of programs offering course work in multiple fields and differing specializations resulting from course selection. For convenience in handling of the data Potable Water, Wastewater and Composite have been reported in multiple volumes because of the numbers involved. Although separated into volumes either by degree level of the programs involved, as in the case of Potable Water and Wastewater, or by content as in the case of Composite, persons interested in any of these fields would be well advised to review each of the volumes to assure more complete coverage.

Along with the standard introductory pages common to volumes of this nature, each volume contains sections on Project Background, Introduction (consisting of sections devoted to a description of the programs surveyed and covered in the volume), Project Commentary, and the Training Summaries along with the Appendices.

REVIEW PROCESS:

In addition to individual training summary reviews conducted by the persons initially interviewed, each volume has been reviewed internally, by persons in the Environmental Protection Agency and by a select group of review committee members. In the final instance, individuals met during the on-site process were nominated by interviewers for inclusion on the review committee, primarily as a result of their obvious expertise in the field and their evidenced interest in the project.

These persons were then contacted by mail or by telephone in an effort to determine their willingness to serve. The rather stringent timelines necessary to keep the project on course and to deliver the finished product as specified were also detailed. In excess of one hundred persons returned their volumes (out of a mailing of 120) and all but five of these provided usable responses. In these five instances either last minute job demands prevented them from carrying out the review in the short timelines, or (in two instances) individuals indicated that they wanted nothing to do with the process. This particular method of review provided a wealth of valuable information, suggestions for revision of specific elements, and general comments helpful in revising the final documents. In all cases an effort was made to seriously consider and incorporate reviewer suggestions. The persons on the various review committees are individually acknowledged in the front of the volume they reviewed.

Photo reprinted from the University
of Missouri, Columbia Bulletin 1977.

INTRODUCTION

Photo reprinted from the
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1975-76

INTRODUCTION

Noise is usually defined as unwanted sound. In contrast to air, water and land pollution, noise pollution is very subtle. Except in rare instances when loud noises shatter breakable objects, noise exposure usually leaves no visible evidence. Today, twenty million Americans have measurable noise-induced hearing losses, half of which are severe handicaps. Fifteen million more Americans are exposed to noise on the job which poses a threat to hearing. Finally, nearly fifteen million Americans are exposed to dangerous noise levels, though often unaware of it, from such sources as trucks, airplanes, motorcycles, hi-fi's, lawnmowers, and kitchen appliances.[1]

Recent evidence shows that continuous exposure to sound exceeding seventy decibels, for instance expressway traffic, can be harmful to hearing. Noise can also cause a temporary stress reaction which includes increases in heart rate, blood pressure, blood cholesterol levels, and effects in the digestive and respiratory systems. Persistent noise exposure can contribute to the development of chronic stress diseases such as high blood pressure and ulcers.[2]

The U.S. Department of Labor is responsible for protection of workers under the Occupational Safety and Health Act (OSHA), and has authority to set noise standards for work places. Under the Noise Control Act of 1972, the U.S. Environmental Protection Agency (EPA) is required to develop and publish information about permissible levels of noise, and then to set noise standards for products that have been identified as major sources of noise. The EPA Administrator is also to prescribe noise emission standards for the operation of equipment and facilities of interstate railroads, trucks, and buses. Aircraft noise control is under the Federal Aviation Administration, but EPA retains an advisory role in formulating standards. EPA also must identify technology gaps in noise control and fund research to fill them.[3]

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[1] U.S. Environmental Protection Agency, "Noise and Its Measurement" (February 1977).

[2] Ibid.

It is the responsibility of states and/or municipalities to control noise from sources other than those covered under federal laws. Until recently, non-federal noise controls chiefly consisted of non-quantitative municipal ordinances, which are usually difficult to enforce due to their subjective nature. Phase I of the National Environmental/Energy Workforce Assessment demonstrated that municipalities are increasingly incorporating numerical acoustical criteria into their ordinances and are more often recording sound levels in response to complaints, thereby facilitating enforcement. States, too, are becoming more aware of the health hazards of noise, and state enabling noise control legislation is becoming more prevalent.

Despite the growing concern and efforts in controlling noise, the noise control field remains a very small portion of the environmental effort within the public sector. Phase I data indicate that presently the noise control workforce within EPA is less than 1 percent of the total EPA workforce. Similarly, all state noise control staffs combined represent approximately 0.8 percent of the state level environmental/energy agency workforce. While data were more limited, Phase I also indicated that while the private sector workforce for noise control exceeds that of the public sector, the total effort is significantly outweighed by the activities in the control of other forms of pollution.

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[3] U.S. Environmental Protection Agency, "EPA Noise Control Program Progress to Date" (March 1977)

This report expands upon Phase I data of the noise control workforce, providing information on educational/training programs in the noise control field. For the purposes of this study, a 'noise program' is not limited to those chiefly emphasizing environmental noise control; such a program also includes related areas such as classical physical acoustics and audiology. This is the case for several reasons: a) data have shown that environmental noise control programs are quite rare, and to limit the study's scope to this area exclusively would necessarily further limit the sample size; and b) related programs, as represented in this document, often offer courses directly or indirectly related to environmental noise, and graduates of these programs often or occasionally become employed in agencies/organizations concerned with environmental noise control. The reader is cautioned, however, to bear in mind that these programs stress environmental noise control to widely varying degrees.

It is noteworthy that all of the programs surveyed are located in the eastern United States. Researchers in the Midwest and West have indicated that efforts to locate programs in these areas were largely unsuccessful. Courses, or course sequences in noise are available in many universities in these regions, however, mainly within mechanical engineering departments. These did not qualify as 'noise programs' for the purposes of this study (see TERMINOLOGY in the Appendix for the definition of a 'program').

All of the programs surveyed (which do not represent all of the noise-related programs in the United States[4]) offer graduate level degrees; one also offers a three-course sequence at the bachelor level. Six of these programs are associated with or located within engineering departments (in several cases, these departments cooperate with various non-engineering departments in offering the programs). A seventh program is housed in a department of industrial environmental health sciences, but offers a strong engineering emphasis. These programs focus on acoustics, and noise and vibration control. The remaining two programs offer degrees in audiology (one specifically in industrial audiology).

While most of these acoustics/audiology programs are independent entities offered by one or more departments, acoustical environmental control at the University of Pittsburgh is one of several specialty programs under Environmental Health Engineering/Industrial Hygiene. The Acoustical Engineering program at the Georgia Institute of Technology consists of a special certificate that is earned by master's and doctoral students, along with satisfying the requirements of the major area (aerospace engineering, electrical engineering, engineering science and mechanics, industrial and systems engineering, mechanical engineering, nuclear engineering, textile engineering, or architecture).

Although the program emphases do vary widely, several generalizations can be made of the course content of those programs surveyed. The acoustics/noise control programs generally offer courses in theoretical and applied acoustics (including waves and wave motions, reverberation and analysis), vibration (structural, mechanical, random, and transient), acoustical and mechanical measurement, and noise and vibration control. Additionally, the programs typically offer more specialized courses in the field, including such subjects as aeroacoustics (4), environmental noise management (2), underwater acoustics (3), architectural acoustics (2), physiological and psychological effects of noise and/or vibration on humans (3), structural acoustics (2), and engineering acoustics (2). Other noise-related courses offered within one or more programs include noise in relation to city and transportation systems planning, acoustic signal processing, feedback control systems, radiation acoustics, industrial noise control (including machinery noise), and audiology. Other acceptable or required courses in more traditional disciplines include the subjects of complex analysis, partial equations, fluid mechanics, bio-medical research, detection theory, general experimental methods, mechanics of machinery, and measurement of motions.

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[4] Of special note is the fact that a number of noise-related educational degree programs described in this volume also offer short courses in the field of acoustics/noise control.

Available to the majority of these programs are facilities for the conduct of research, and classroom demonstration. Most common are anechoic chambers, reverberation chambers, vibration testing facilities, and computer analysis systems. Also accessible to one or more programs are flow duct acoustics facilities, acoustical physics laboratories, simulation laboratories, audiometric testing facilities, and other laboratories. Information regarding research activities and facilities specific to each program may be found in the individual program summaries.

The two audiology programs surveyed concentrate on human factors, offering courses in the anatomy and physiology of the hearing mechanism, diagnosis of auditory disorders, clinical practice of audiology, aural rehabilitation, physiological acoustics, and psychoacoustics. They also cover the measurement and calibration of instrumentation typically used in speech and hearing science. Both programs include courses in hearing conservation, focused towards industrial settings, as well as towards the general environment. Students in both of these programs participate in clinical practicum experience.

In addition to the degree-granting educational programs, this report presents descriptions of two training programs in the noise field. One offers courses in audiometric orientation for industrial hearing conservationists. This is one example of many similar training courses offered by public and private agencies throughout the country. This program and many others follow the guidelines of the Council for Accreditation in Occupational Hearing Conservation (CAOHC). The second non-degree-granting program included in this report actually consists of a number of courses offered by a state agence in noise control; the courses vary with respect to specific purpose, content, and participants.

A list of the noise programs surveyed, the institutions, and degrees offered is presented in Table 2. Each of these programs is described individually in the Noise Training Summaries section of this report. The reader is also referred to Table 9, on page 75, which provides data summaries for the degree programs on such variables as enrollment, graduates, faculty, graduate employment, and work-study programs. Additional information is presented on these programs in narrative and tabular form, which are detailed in the Table of Contents.

For a complete listing of all the schools and programs included in the Phase II study of the National Environmental/Energy Workforce Assessment (in the areas of air, energy, noise, pesticides, potable water, radiation, solid waste, wastewater, and composite), see Table 1, which follows.

TABLE I

PARTICIPATING INSTITUTIONS

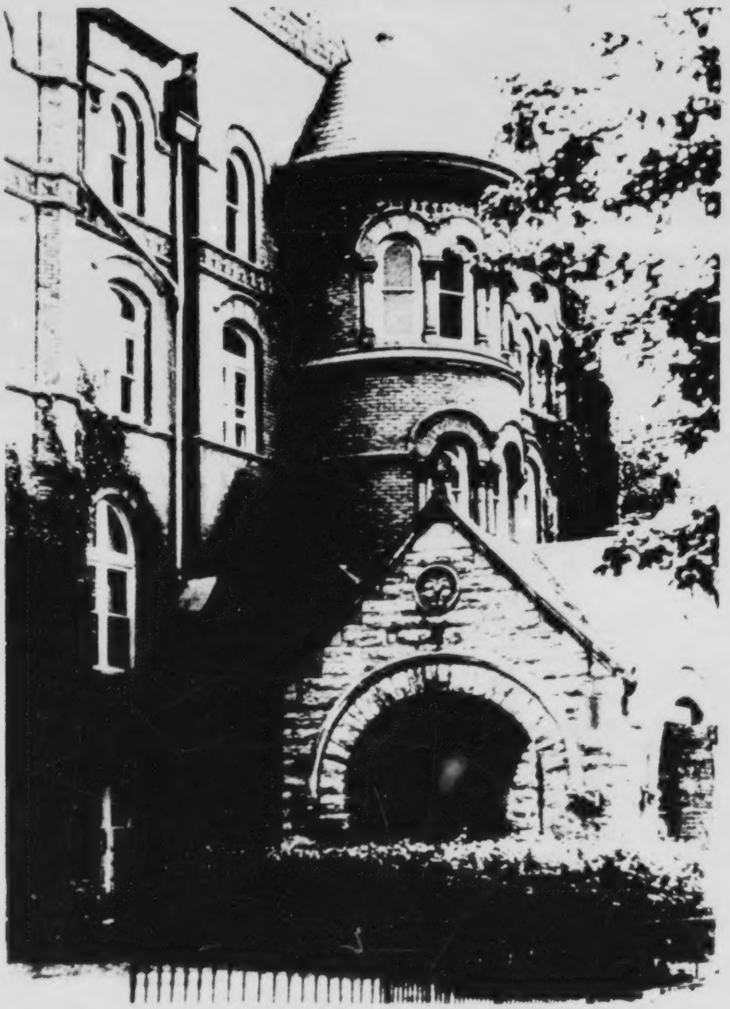

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Table 1 is a comprehensive listing of all institutions which participated in the post-secondary educational profile of the National Environmental/Energy Workforce Assessment. Listed by state, institution, and degree are programs surveyed in the areas of air, energy, noise, pesticides, potable water, radiation, solid waste and wastewater.

An explanation of the degree abbreviations utilized within the report may be found in Appendix I, entitled "Degree Abbreviations". For a complete listing of the institutions visited in a media specific area (i.e., air, energy, etc.), attention is drawn to Appendix IV, entitled "Participating Institutions by Environmental Category".

The Table in part III of the Project Findings, entitled "A Summary Profile of Representative Educational Programs" follows the narrative and is a presentation of specific institutions visited for the particular volume.

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PARTICIPATING INSTITUTIONS

STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)*
AL	University of Alabama University	Environmental Engineering	M.S. (3)
AK	University of Alaska Fairbanks	Environmental Quality Engineering Science	M.S.
AR	University of Arkansas Fayetteville	Agricultural Engineering	B.S. M.S. Ph.D.
		Civil Engineering	M.S.C.E.
		Environmental Engineering	M.S.En.E.
		Environmental Science	B.S.
CA	California Institute of Technology Pasadena	Environmental Engineering Science	M.S. Ph.D.
	California Polytechnic State University San Luis Obispo	Environmental Engineering	B.S.
	California State University-Sacramento Sacramento	Civil and Environmental Engineering	B.S. M.S.
	Stanford University Stanford	Environmental and Water Studies	M.S. Ph.D.
	University of California-Berkeley Berkeley	Nuclear Engineering	B.S. M.S. M.E. Ph.D. D.E.
		Pest Management	B.S.
		Sanitary Engineering	M.S. M.E. Ph.D.
	University of California-Davis Davis	Environmental Toxicology	B.S.
		Plant Protection and Pest Management	M.S.

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PARTICIPATING INSTITUTIONS

STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	University of California-Davis (Cont'd)	Entomology	B.S. M.S. Ph.D.
	University of California-Riverside Riverside	Pest Management	M.S.
	University of California-Santa Barbara Santa Barbara	Environmental Studies	B.A.
CO	Colorado State University Fort Collins	Environmental Engineering (Civil)	M.S. Ph.D.
	Community College of Denver-Red Rocks Golden	Water-Wastewater Technology	A.A.
CT	Hartford State Technical College Hartford	Nuclear Engineering Technology	A.S.
	Yale University New Haven	Environmental Health	M.P.H.
DE	Delaware Technical and Community College Newark	Environmental Engineering Technology	A.A.S.
	University of Delaware Newark	Entomology and Applied Ecology	B.S.
		Environmental Engineering	M.A.S. M.E. Ph.D. (App. Science) Ph.D. (ChE)
DC	Catholic University Washington	Civil Engineering	B.S.
	Howard University	Environmental Engineering	M.E.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
FL	Broward Community College Fort Lauderdale	Pest Control Technology	A.S.
	Central Florida Community College Ocala	Radiological Health Technology	A.S.
	Florida International University Miami	Environmental Studies	B.A. B.S.
		Environmental Engineering Technology	B.S.
	Heed University Hollywood	Ocean and Environmental Affairs	M.A. Ph.D.
	Miami-Dade Community College Miami	Environmental Engineering Technology	A.S.
		Marine Science Technology	A.S.
	University of Florida Gainesville	Air Pollution	M.E. M.S. Engineer Ph.D.
		Environmental Biology	M.E. M.S. Engineer Ph.D.
		Environmental Resources Management Activities	M.E. M.S. Engineer Ph.D.
		Systems Ecology	M.E. M.S. Engineer Ph.D.

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PARTICIPATING INSTITUTIONS

STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	University of Florida (Cont'd)	Water Supply and Water Pollution Control	M.E. M.S. Engineer Ph.D.
		Nuclear Engineering	B.S.(N.E.) B.S.E.(N.E.) M.E. M.S. Engineer Ph.D.
		Radiological Sciences	M.E. M.S.
	University of Miami Miami	Marine and Atmospheric Science	M.S. Ph.D.
GA	Abraham Baldwin Agricultural College Tifton	Plant Protection	A.Ag.
	Atlanta University Center/ Georgia Institute of Technology Atlanta	Water Pollution Control Design Engineering	B.S. B.E.
	Georgia Institute of Technology Atlanta	Acoustical Engineering	Advanced Cert.
		Energy Engineering	Advanced Cert.
		Environmental Studies	Advanced Cert.
	Southern Technical Institute Marietta	Nuclear Safety	A.S.
	University of Georgia Athens	Entomology	B.S. A.B. M.S. M.P.P.P.M. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	University of Georgia (Cont'd)	Environmental Health Science	B.S.E.H.
HI	University of Hawaii Honolulu	Environmental and Sanitary Engineering	M.S.
IL	Illinois Institute of Technology Chicago	Environmental Engineering	B.S.E.S. M.S. Ph.D.
	Prairie State Community College Chicago Heights	Air, Water, Wastewater	A.A.S.
	Sangamon State University Springfield	Environments and People	B.A. M.A.
	Southern Illinois University-Edwardsville Edwardsville	Wastewater Treatment Operator Training	Cert.
IN	Indiana University Bloomington	Environmental Programs	Cert. A.S. B.A. B.S. M.P.A. M.S.E.S. Ph.D. (minor)
	Purdue University West Lafayette	Environmental Sciences Option	B.S.
		Nuclear Engineering	B.S.N.E. M.S. Ph.D.
IA	Iowa State University Ames	Environmental Studies	B.A. B.S.
		Sanitary Engineering and Water Resources	M.S. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Kirkwood Community College Cedar Rapids	Environmental Health Assistant	Diploma
		Environmental Health Technician	A.A.
		Water and Wastewater	Diploma
	University of Iowa Iowa City	Environmental Engineering	M.S. Ph.D.
		Environmental Toxicology	M.S. Ph.D.
KS	Kansas State University Manhattan	Chemical Engineering	B.S. M.S. Ph.D.
		Mechanical Engineering	B.S. M.S. Ph.D.
		Nuclear Engineering	B.S. M.S. Ph.D.
		Sanitary Engineering	M.S.C.E.
	University of Kansas Lawrence	Environmental Health Engineering	M.S. Ph.D.
		Environmental Health Science	M.S. Ph.D.
		Environmental Studies	B.A.
		Radiation Biophysics	B.A. B.S. M.S. Ph.D.
		Water Resources Engineering and Science	M.S. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
KY	Morehead State University Morehead	Environmental Studies	B.S. A.B.
		Mining Technology	A.A.S.
	Pikeville College Pikeville	Mining Technology	A.M.T.
	University of Kentucky Lexington	Energy (Coal) Engineering	M.S. Ph.D.
		Environmental Engineering	M.S. Ph.D.
	University of Louisville Louisville	Environmental Engineering	B.S. M.Eng.
	Western Kentucky University Bowling Green	Environmental Science	B.S.
		Environmental Engineering	B.S.
LA	Delgado College New Orleans	Urban Pest Management	A.S.
		Water/Wastewater Technology	A.S.
		Environmental Health Technology	A.S.
	McNeese State University Lake Charles	Environmental Science	B.S. M.S.
ME	Eastern Maine Vocational Technical Institute Bangor	Environmental Control Technology	A.A.S.
	New England Regional Wastewater Institute (S. Maine Vocational Technical Institute) S. Portland	Wastewater Treatment Technology	Cert.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	University of Maine-Orono Orono	Sanitary Engineering	M.S.C.E. Ph.D.
MD	Charles County Community College La Plata	Pollution Abatement Technology	A.A.
	Johns Hopkins University Baltimore	Environmental Engineering	M.A. M.S.E. M.S. Ph.D
	University of Maryland College Park	Environmental Engineering	M.S.
		Nuclear Engineering	M.S.
		Pest Management	M.S.
MA	Harvard University Cambridge	Environmental Health Sciences	S.M. Sc.D.
		Environmental Sciences and Engineering	S.M. M.E. Ph.D.
		Toxicology	S.M. Sc.D.
	Massachusetts Institute of Technology Cambridge	Acoustics	S.M. Sc.D./ Ph.D.
		Environmental Engineering	Env.E.
		Mineral Resources Engineering and Management	S.M. Engr. Sc.D./ Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Massachusetts Institute of Technology (Cont'd)	Nuclear Engineering	S.B. S.M. N.E. Sc.D./ Ph.D.
		Water Resources and Environmental Engineering	S.B. S.M. Sc.D./ Ph.D.
		Wastewater Treatment Plant Operations	Cert.
	Northeastern University Boston	Environmental Engineering and Science	M.S.
	Springfield Technical Community College Springfield	Environmental Technician	A.S.
	Tufts University Medford	Environmental Health Engineering	B.S.C.E. M.S.
	University of Lowell Lowell	Radiological Health Physics/Radiological Sciences and Protection	B.S. M.S.
		Wastewater Treatment Plant Operations	Cert.
MI	Ferris State College Big Rapids	Environmental Health Technician	A.A.S.
		Environmental Health	B.S.
	Michigan State University East Lansing	Environmental Conservation Education	M.S. Ph.D.
		Environmental Engineering	B.S.C.E. M.S. (emphasis) Ph.D. (emphasis)

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Michigan State University (Cont'd)	Natural Resources and Environmental Education	B.S.
		Systems Science (Ecological Systems)	B.S. M.S. Ph.D.
	Michigan Technological University Houghton	Environmental Engineering	B.S.C.E. B.S.E. M.S.C.E.
	University of Michigan Ann Arbor	Environmental Education	M.S.
		Environmental Sciences Engineering	B.S.
		Industrial Hygiene and Air Pollution	M.P.H. M.S. Dr.P.H. Ph.D.
		Radiological Health	M.P.H. M.S. Dr.P.H. Ph.D.
		Water Resources: Engineering	M.S.E. Ph.D.
		Management Science	M.S. Ph.D.
		Water Quality	M.P.H. M.S. Dr.P.H. Ph.D.
MN	Bemedji State College Bemedji	Environmental Studies	B.S. M.A.
	Macalester College St. Paul	Environmental Studies	B.A. B.S.
	University of Minnesota Minneapolis	Environmental Health	M.P.H. M.S. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
MS	Mississippi State University Mississippi State	Specialized Training in Pest Management	M.Ag.
MO	Missouri Southern State College Joplin	Environmental Health Technology	A.S. B.S.
		Radiologic Technology	A.S.
	St. Louis Community College at Forest Park St. Louis	Radiologic Technology	A.S.
	University of Missouri-Columbia Columbia	Sanitary Engineering	B.S. M.S. Ph.D.
	University of Missouri-Rolla Rolla	Environmental and Sanitary Engineering	M.S. Ph.D.
	Water and Wastewater Technical School Neosho	Water and Wastewater Training	Cert.
	Washington University St. Louis	Air (emphasis)	M.S. D.Sc.
MT	Montana State University Bozeman	Environmental Engineering	M.S.
		Environmental Health Technology	M.S.
	Northern Montana College Havre	Environmental Health Technology	A.A. Cert.
NE	Central Technical Community College Hastings	Agriculture Technology	Cert. 1-Year Diploma 2-Year Diploma A.A.S. A.S.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	University of Nebraska Lincoln	Sanitary Engineering	B.S. M.S. Ph.D.
		Water Resources Engineering	M.S.
		Planning and Management	M.S.
NH	University of New Hampshire Durham	Entomology	B.S. B.A.
NJ	Middlesex County College Edison	Environmental Health Science Technology	A.A.S.
	New Jersey Institute of Technology Newark	Interdisciplinary Studies in Environmental Engineering	M.S.
	Princeton University Princeton	Energy Conversion and Resources	Topical Programs
	Rutgers-SUNJ New Brunswick	Biology (option in entomology)	B.S. B.A.
		Entomology and Economic Zoology	M.S. M.P. Ph.D.
		Environmental and Business Economics	B.S.
		Environmental Science	M.S. Ph.D.
		Environmental Studies	B.S.
		Environmental and Water Resources Engineering	M.S. Ph.D.
		International Environmental Studies	B.A. B.S.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Rutgers-SUNJ (Cont'd)	Radiation Sciences	M.S. Ph.D.
	Stevens Institute of Technology Hoboken	Air Pollution Control Engineering	Cert.
		Water and Wastewater Engineering	Cert.
NM	New Mexico State University Las Cruces	Pest Management	B.S.
	University of New Mexico Albuquerque	Nuclear Engineering	M.S. Ph.D.
NY	Clarkson College Potsdam	Civil and Environmental Engineering	B.S. M.S.
	Columbia University New York City	Nuclear Engineering	B.S. M.S. Nuc.Engr. Eng.Sc.D.
	Cornell University Ithaca	College Program in Energy Conversion	B.S.
		Environmental Engineering	B.S. M.S. M.Eng. Ph.D.
		Waste Management Engineering	M.S. M.Eng. M.P.S. Ph.D.
		Nuclear Engineering	M.Eng. M.S. Ph.D.
	Hofstra University Hempstead	Solid Waste Management	Cert.
	Hudson Valley Community College Troy	Public Health Technology (Environmental option)	A.A.S.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Hunter College New York City	Environmental Health Science	B.S. M.S.
	Manhattan College New York City	Environmental Engineering and Science	M.S. M.E.
	Polytechnic Institute of New York New York City	Energy Engineering and Policy	Cert. M.S.
		Environmental Engineering and Planning	M.S.C.E. M.E.H.S. Engr. Ph.D.
	Rensselaer Polytechnic Institute Troy	Environmental Engineering	B.S. M.E. M.S. D.E. Ph.D.
		Nuclear Engineering	B.S. M.S. M.E. Ph.D.
	Rochester Institute of Technology Rochester	Civil Engineering Technology (Environmental option)	B.T.
	State University of New York-Buffalo Buffalo	Water Resources and Environmental Engineering	B.S. M.S. Ph.D.
	State University of New York Farmingdale	Pest Control Technology	A.A.S.
	Syracuse University Syracuse	Chemical Engineering	B.S. M.S. Ph.D.
		Environmental Engineering	B.S.
		Sanitary Engineering, Sanitary Science, Civil Engineering	M.S.(S.E.) M.S.(S.S.) Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	The Cooper Union New York City	Integrated Master's Program with concentration in Environmental Engineering	M.E.
	Ulster County Community College Stone Ridge	Water Quality Management Training	A.A.S.
	University of Rochester Rochester	Toxicology Training Program	M.S. Ph.D.
NC	Duke University Durham	Environmental Management	M.E.M.
		Civil Engineering/ Urban and Environmental Engineering	M.S. Ph.D.
	North Carolina State University Raleigh	Agricultural Pest Control	A.A.S.
		Pest Management	B.S. M.S. (minor)
		Air Conservation	M.S. (minor) M.E. (minor) Ph.D.(minor)
		Environmental Engineering	M.S. M.C.E. Ph.D.
		Acoustic, Noise Vibration	M.S. M.M.E. Ph.D.
	University of North Carolina Chapel Hill	Air and Industrial Hygiene	M.S. M.S.P.H.
		Environmental Chemistry and Biology	M.S. M.S.P.H. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	University of North Carolina (Cont'd)	Environmental Management Protection	M.S. M.S.P.H. Ph.D.
		Radiological Hygiene	M.S. M.S.P.H. Ph.D.
		Water Resources Engineering	M.S. M.S.P.H. M.S.E.E. Ph.D.
	Wilson County Technical Institute Wilson	Sanitary Landfill Operating Manager	Cert. Diploma A.A.S.
		Sanitary Landfill Technology	A.A.S.
ND	North Dakota State School of Science Wahpeton	Environmental Science Technology	A.A.
OH	Antioch College Yellow Springs	Environmental Studies	B.S.
	Hocking Technical College Nelsonville	Environmental Health Technology	A.A.S.
	Miami University Oxford	Environmental Science	M.En.
	Muskingum Area Technical College Zanesville	Environmental Quality Control Technology	A.A.S.
		Natural Resources Conservation Technology	A.A.S.
		Petroleum Engineering Technology	1-Year Cert. A.A.S.
	Ohio State University Columbus	Agricultural Engineering	B.S. M.S. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Ohio State University (Cont'd)	Chemical Engineering (air)	B.S. M.S. Ph.D.
		Civil Engineering	B.S. M.S. Ph.D.
		Environmental Biology	M.S. Ph.D.
		Environmental Education	B.S.(Ed.) B.S.(N.R.) M.S. Ph.D.
		Toxicology (Pharmacology)	M.S. Ph.D.
	Ohio University Athens	Environmental Studies	M.S.
	Raymond Walters General and Technical College (University of Cincinnati) Cincinnati	Environmental Control/ Protection Technology	A.S.
	University of Cincinnati Cincinnati	Air Pollution and Industrial Hygiene	M.S. Ph.D.
		Civil and Environmental Engineering	M.S. Ph.D.
		Environmental Health	M.S. Ph.D.
		Mechanical and Industrial Engineering (noise)	B.S. M.S. Ph.D.
		Occupational Medicine	M.S. Ph.D.
		Toxicology	M.S. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	University of Cincinnati (Cont'd)	Acoustics and Noise Control	B.S. M.S. Ph.D.
	University of Toledo Toledo	Chemical Engineering, Civil Engineering	B.S. M.S.
		Engineering Science	M.S.
OK	East Central Oklahoma State University Ada	Environmental Science	B.S.
	OSU Oklahoma City Technical Institute Oklahoma City	Civil Technology	A.S.
	Oklahoma State University Stillwater	Engineering Technology	A.D. B.S.
		Radiation and Nuclear Engineering Technology	A.D. B.S.
	Oscar Rose Junior College Midwest City	Wastewater Technology	A.A.S.
		Environmental Science	A.A.S.
	University of Oklahoma Norman	Environmental Science	B.S. M.S. Ph.D.
OR	Linn-Benton Community College Albany	Wastewater Technology	A.S.
		Water/Wastewater Technology	A.S.
		Water/Wastewater Plant Operator	Cert.
	Oregon Institute of Technology Klamath Falls	Environmental Technology	A.A.S. B.T.
	Oregon State University Corvallis	Nuclear Engineering Technology	B.S.
		Nuclear Engineering	B.S. M.S.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Oregon State University (Cont'd)	Pest Management and Plant Pathology	B.S. M.S.
	Portland State University Portland	Engineering and Applied Science	B.S. M.S.
PA	Carnegie-Mellon University Carnegie Institute of Technology Pittsburgh	Environmental Engineering	B.S. M.S. Ph.D.
	Drexel University Philadelphia	Environmental Engineering and Science	M.S.E.E. M.S.E.S. Ph.D.
	Pennsylvania State University University Park	Acoustics	M.E. M.S. Ph.D.
		Air Pollution Control Technology	A.A.P.C.T.
		Entomology	B.S. M.Agr. M.S. Ph.D.
		Environmental Engineering	B.S. M.S. M.E.E.E. Ph.D.
		Environmental Pollution Control	M.S. M.E.P.C. M.E.
		Environmental Resource Management	B.S.
		Minerals Processing	M.S. Ph.D.
		Mining Technology	A.A.S.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Pennsylvania State University (Cont'd)	Mining Engineering	B.S. M.S. M.E. Ph.D.
		Nuclear Engineering Technology	A.N.E.T.
		Nuclear Engineering	B.S. M.S. M.E. Ph.D.
		Petroleum and Natural Gas Engineering	B.S. M.S. Ph.D.
		Water Resources Engineering Technology	B.T.
	Slippery Rock State College Slippery Rock	Environmental Studies	B.S.
	Temple University Philadelphia	Environmental Technology	A.T.
		Environmental Engineering Technology	B.S.
	University of Pennsylvania Philadelphia	Energy Engineering	M.S.E.
		Energy Management and Policy	M.S.E.M.P. Ph.D.
	University of Pittsburgh Pittsburgh	Environmental and Sanitary Engineering	B.S. M.S. Ph.D.
		Environmental Systems Engineering	degrees granted through Engr. Dept.
	School of Public Health (University of Pittsburgh) Pittsburgh	Acoustic Environmental Control	M.S.(Hyg.) D.S.(Hyg.)
		Air Resources	M.S.(Hyg.)

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	School of Public Health (University of Pittsburgh) (Cont'd)	Environmental Health Engineering	M.P.H. D.S.(Hyg.)
		Environmental Health Planning	D.S.(Hyg.)
		Health Aspects of Water Quality	M.S.(Hyg.)
		Industrial Hygiene	M.S.(Hyg.)
		Toxicology	D.S.(Hyg.) Ph.D.
		Radiation Health	M.S.(Hyg.) D.S.(Hyg.) Ph.D. D.P.H.
RI	University of Rhode Island Kingston	Environmental Engineering	B.S. M.S. Ph.D.
SC	Clemson University Clemson	Air Pollution	M.S. M.Engr.
		Natural Systems	M.S. M.Engr.
		Planning and Management	M.S. M.Engr.
		Water Treatment Systems	M.S. M.Engr.
		Environmental Systems Engineering	Ph.D.
	Greenville Technical College Greenville	Wastewater Technology	A.A.S.
	Sumter Area Technical College Sumter	Environmental Engineering Technology	A.E.T.
TN	Chattanooga State Technical Community College Chattanooga	Environmental Science Technology	A.S.
		Nuclear Technology	A.S.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	East Tennessee State University Johnson City	Environmental Health	B.S.E.H. M.S.E.H.
	Memphis State University Memphis	Audiology	M.A. Ph.D.
	Middle Tennessee State University Murfreesboro	Environmental Science and Technology	B.S.
	State Technical Institute at Memphis Memphis	Environmental Engineering Technology	A.E.
	University of Tennessee Knoxville	Environmental Engineering	M.S.E.E. M.E. Ph.D.
		Environmental Engineering (Air Quality and Pollution Control)	M.S.E.E. M.E. Ph.D.
		Environmental Engineering (Water Pollution Control/ Water Resources)	M.S.E.E. M.E. Ph.D.
		Industrial Audiology	M.A.
		Nuclear Engineering	B.S. M.E. M.S. Ph.D.
		Water Resources Development	M.S.
	Vanderbilt University Nashville	Environmental and Water Resources Engineering (EWRE)	B.E.
		Environmental Science	B.S.
		EWRE (Environmental Science)	M.S. M.Eng. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
	Vanderbilt University (Cont'd)	EWRE (Air Resources)	M.S. M.Eng. Ph.D.
		EWRE (Solid Waste)	M.S. M.Eng. Ph.D.
		EWRE (Water and Wastewater Treatment/Water Resources)	M.S. M.Eng. Ph.D.
TX	Baylor University Waco	Institute of Environmental Studies	B.A. B.S.
	Lamar University Beaumont	Environmental Science	B.S.
		Energy Resource Management	B.S.
	Rice University Houston	Environmental Science and Engineering	M.S.
	Sam Houston State University Huntsville	Environmental Science	B.S.
	Texas A & M University College Station	Environmental Engineering	M.S. Ph.D.
		Entomology	M.S.
		Entomology/Pest Management Option	M. Ag.
	Texas State Technical Institution Waco	Nuclear Technology	A.A.S.
		Water/Wastewater Technology	A.A.S.
		Water Utility Operator	Certificate
	University of Texas Austin	Environmental Health Engineering	M.S. Ph.D.
		Water Resources Engineering	M.S. Ph.D.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
UT	Brigham Young University Provo	Chemical Engineering	B.S. M.S.
		Water Resources and Environmental Engineering	B.S. M.S.
	University of Utah Salt Lake City	Civil Engineering	B.S. M.E. M.S. Ph.D.
	Utah State University Logan	Civil and Environmental Engineering	B.S. M.S. Ph.D.
		Pest Management	B.S. M.S.
		Environmental Studies	B.S.
VA	George Washington University NASA-Langley Institute Hampton	Acoustics	M.S. Sc.D.
		Environmental Modeling	M.S.
	J.Sargeant Reynolds Community College Richmond	Environmental Technology Environmental Operations	Cert. A.A.S.
		Ground Water Resources	Cert.
	Virginia Polytechnic Institute and State University Blacksburg	Civil Engineering Technology	B.S.
		Sanitary Engineering/Environmental Sciences and Engineering/Civil Engineering	M.S. Ph.D.
	Wytheville Community College Wytheville	Environmental Technology	Cert.

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STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
WA	The Evergreen State College Olympia	Coordinated Studies	B.A.
	University of Washington Seattle	Environmental Studies	B.A. B.S.
		Air Resources	M.S. Ph.D.
	Washington State University Pullman	Environmental Science	B.S. M.S.
		Chemical Engineering	M.S.
		Air Pollution Control Engineering	M.S.
		Air Pollution Science	M.S.
		Air Pollution Option	M.S.
		Air Pollution Program	M.S.
	Western Washington University Bellingham	Environmental Studies	B.S.
WV	Bluefield State College Bluefield	Mining Engineering Technology	A.S. B.S.
	West Virginia Institute of Technology Montgomery	Mining Engineering Technology	A.S.E.M.T. B.E.M.T.
	West Virginia University Morgantown	Engineering of Mines	B.S.
		Environmental Engineering	M.S.C.E. M.S.E.
		Mineral Processing Engineering	B.S. M.S.
		Mineral Resource Economics	M.S.
		Petroleum Engineering	B.S. M.S.

TABLE I

PARTICIPATING INSTITUTIONS

STATE	INSTITUTION	PROGRAM TITLE	DEGREE(S)
WI	Marquette University Milwaukee	Environmental Engineering	B.A. B.S.
	Northland College Ashland	Environmental Studies	B.A.
	University of Wisconsin-Green Bay Green Bay	Environmental Emphasis	B.A. B.S. M.E.A.S.
	University of Wisconsin-Madison Madison	Civil and Environmental Engineering	B.S.
		Environmental Communications	M.A. M.S.
		Water Resources Management, Environmental Monitoring, Land Resources	M.S. Ph.D.
	University of Wisconsin-Milwaukee	Atmospheric and Marine Environmental Program	M.S. M.E.
WY	Casper College Casper	Water Quality Technology	A.S.
	University of Wyoming Laramie	Civil Engineering	M.S. Ph.D.

Other Programs

The following programs were included in the on-site visit process and offer training through various institutes, centers, state agencies, or college consortiums. Program descriptions can be found in the volume specified.

State	Institution	Program	Volume
FL	Florida Department of Environmental Regulation	Environmental Noise Control Training	Noise
	Miami-Dade Community College	NPDES Effluent Monitoring Training	Wastewater I
		Wastewater Treatment Plant Operations	Wastewater I
		Water Treatment Plant Operations	Potable Water I
	University of Miami School of Medicine	Pesticide Protection	Pesticides
KS	Kansas State University	Institute for Environmental Research	Composite II III Business and Industry
MI	Michigan State University	Institute of Water Research	Potable Water I
		Pesticide Research Center	Pesticides
NE	University of Mid-America	Pests, Pesticides and Pesticide Safety	Pesticides

State	Institution	Program	Volume
NJ	Princeton University	Environmental Science and Policy	Composite I
NC	U.S. Environmental Protection Agency	Air Pollution Training Institute	Air
OH	Ohio State University	Center for Lake Erie Area Research	Potable Water I
		Cooperative Extension Service Activities	Composite II and III
		Water Resources Center	Potable Water I
PA	Air Pollution Control Association	Refresher, Continuing Education Courses	Air
	University of Pittsburgh	Environmental Systems Engineering	Composite I
TN	Memphis State University	Nuclear Reactor Fundamentals	Energy
		Radiation Technician Training Course	Radiation
	Oak Ridge Associated Universities	Radiation Emergency Assistance Center/ Training Site	Radiation
		Special Training	Energy Radiation
	University of Tennessee Center For Health Sciences	Training Courses in Audiometric Orientation	Noise

Photo reprinted from the Marquette University Bulletin 1977-78

PROJECT FINDINGS

Photos reprinted from the Michigan Technological University Catalog 1975-76

I. A SUMMARY PROFILE OF REPRESENTATIVE NOISE EDUCATIONAL PROGRAMS

A. States, Institutions, Programs and Degrees

Phase II looked at eleven noise programs, nine of which offer academic degrees, which vary in size in description. They are located in four federal regions, and in eight states. Except for one three-course sequence in noise control at the bachelor level, all degree programs surveyed offer graduate level degrees. The following table lists the programs included in this report, the degree(s) offered, if any, and the states in which they are located.

TABLE 2

NOISE PROGRAMS BY INSTITUTION AND STATE

State	Institution	Program	Degree
Florida	Florida Department of Environmental Regulation	Environmental Noise Control Training	Non-academic Certificate
Georgia	Georgia Institute of Technology	Acoustical Engineering	Advanced Certificate
Massachusetts	Massachusetts Institute of Technology	Acoustics	S.M. Sc.D. Ph.D.
North Carolina	North Carolina State University	Acoustics, Noise and Vibration	M.S. M.M.E. Ph.D.
Ohio	University of Cincinnati	Acoustics and Noise Control	B.S. M.S. Ph.D.
Pennsylvania	The Pennsylvania State University	Acoustics	M.E. M.S. Ph.D.
	University of Pittsburgh	Environmental Health Engineering/Industrial Hygiene (Acoustical Environmental Control)	M.S. M.P.H. D.S. Ph.D.

TABLE 2 (Cont'd)

State	Institution	Program	Degree
Tennessee	Memphis State University	Audiology	M.S. Ph.D.
	University of Tennessee	Industrial Audiology	M.A.
	University of Tennessee Center for Health Sciences	Audiometric Orientation	Non-academic Certificate and CEU's
Virginia	George Washington University/NASA	Acoustics	M.S. Sc.D.

B. Enrollment Statistics and Graduates

The greatest number of students in the programs surveyed are earning the master's degree. The master's enrollment varies widely from program to program, ranging from zero in a recently developed program, to two and three in several ongoing programs, and as high as twenty-four in one program. The large majority of master's students are pursuing the Master of Science degree.

The enrollment in doctoral programs also varies, ranging from one to twenty-three in the programs surveyed. The preponderance of students are pursuing the Doctor of Philosophy degree, while some are enrolled in Doctor of Science degree programs.

The following table summarizes the enrollment profiles of the noise degree programs surveyed during Phase II. The reader should keep in mind several facts when reviewing this table:

1) these figures do not include all noise degree program in the country;

2) the enrollment figures do not include the Georgia Institute of Technology, as officials are not ordinarily aware of the number of persons pursuing the Acoustical Engineering certificate;

3) although for the University of Pittsburgh, only enrollment figures for the entire department are available, to prevent distortion of figures, the number enrolled in the acoustics program has been assumed to be 10 percent of the total (the annual number of acoustics graduates is known to be 10 percent of the total);

4) in cases where breakdowns between master's and doctoral programs are unavailable, each doctoral degree was assumed to comprise 10 percent of the total;

5) the enrollment change (up/down/stable) indicates apparent enrollment trends over the last three years, and each degree has one response;

6) the bachelor program enrollment represents those taking a three-course sequence in noise control, not an actual noise control curriculum;

7) in several cases, the number of part-time students is unavailable (see Table 9 for specifics).

TABLE 3

NOISE ENROLLMENT PROFILE

Degree	Enrollment Full-Time	Enrollment Part-Time	Graduates - Average # Per Year	Enrollment Change Up	Down	Stable	NA
Bachelor	30	0	30	1	0	0	0
Masters	84	17	38	3	0	6	3
Doctoral	50	7	13	3	0	4	3
TOTAL	164	24	81	7	0	10	6

As can be seen from Table 3, the majority of the degree programs (59 percent of the responses) have maintained stable enrollment over the last three years. The remainder have indicated upward enrollment trends.

In seven of the programs, information is available on the ratio of male to female students. Of the 164 students enrolled in these programs, 14 percent are female. In engineering programs, the percentage of female students ranges from zero to 20 percent. The smallest percentage is at the doctoral level. The program with the largest ratio of women is the M.A. in Audiology at Memphis State University, in which ten out of fourteen students are female; all three doctoral students, however, are male.

C. A Description of Student Origin

In the nine degree-granting programs surveyed, the in-state student predominates, as may be seen in Table 9. Three factors seem to influence out-of-state enrollment:

1) lack of reciprocal agreements between states regarding tuition adjustments for out-of-state students (in many cases);
2) legislative parameters specifying the ratio of in-state to out-of-state students;
3) proximity to neighboring states.

Graduate students appear to include additional factors in their program selection, i.e., research facilities, monies for financial assistance, the specific interests of faculty members, and the reputation of the institution and program.

D. Employment

Table 9 provides graduate employment percentages for individual programs in four categories: industry, consulting, government, and other. These figures were provided by faculty members as facts or as estimates. The column entitled "Graduate Follow-Up" in Table 9 serves as an indicator of the employment figures' reliability, i.e., if follow-up is not carried out by a program, the employment figures must be regarded as estimates that were made by faculty members. Table 4 compiles employment data from Table 9, giving a total graduate employment picture of the nine degree programs surveyed. This table indicates that, according to data, 58 percent of the graduates enter the private sector, 30 percent accept governmental positions, and 12 percent choose other employment, most often academic.

TABLE 4

NOISE EMPLOYMENT PROFILE

Degree	Private Sector			Total Private	Government	Other
	Industry	Consulting	Combined*			
Bachelor	75%	10%	-	85%	10%	5%
Masters	16%	4%	32%	52%	40%	8%
Doctoral	15%	5%	29%	49%	33%	18%
Noise Employment Average	34%	6%	18%	58%	30%	12%

*This category includes industry and consulting combined, as in several cases, private sector data were not reduced to industry vs. consulting.

It should be noted that the figures do not include data for the Georgia Institute of Technology, and the University of Pittsburgh, as the information was unavailable. Table 9 figures for the University of Tennessee were not utilized, as these are based upon projection, rather than present findings.

The data in Table 4 were compiled for each degree level by utilizing the average annual graduates figure within each program, and obtaining employment figures in real numbers. These real numbers for each program were then totaled and reworked into total percentages. Similarly, the national averages were computed using real numbers.

An in-depth discussion of specific occupations that graduates of these programs enter, in the private and public sectors, may be found in the Additional Findings (E. Environmental Occupations) of this report.

E. A Description of the Faculty

Table 9 indicates that 157 faculty members are involved in carrying out the teaching, research, and/or administrative responsibilities of these noise-related degree programs. Seventy-one, or 45 percent of these faculty members carry out functions for these programs on a full-time basis, while eighty-six, or 55 percent assist on a part-time basis (although they may be full-time with the university). It should be noted that the number of faculty for the University of Pittsburgh (sixteen full-time and twenty-four part-time) refer to the department as a whole, not solely acoustical engineering.

Although a student-faculty ratio could be developed, it would be less than meaningful because:

1) some faculty members are primarily engaged in research;
2) a variety of departments supply faculty for occasional courses or other duties;
3) in addition to their regular course load, some faculty members teach an overload (additional courses).

F. A Discussion of Applied Study Terms

Four of the programs surveyed include applied study terms as an integral part of the curriculum. Two of these are audiology programs, at Memphis State University and the University of Tennessee. These consist of practicum experience received by all students in the audiology field. At Memphis State, this is carried out within the Speech and Hearing Center, in which the program is housed. Students in the Industrial Audiology program at the University of Tennessee will spend a portion of their clinical experience at local factories.

Also offering applied study terms are George Washington University and The Pennsylvania State University. Additionally, starting in 1977-1978, those industrial hygienists enrolled in the University of Pittsburgh School of Public Health will participate in an applied study program, spending two trimesters in university study and two trimesters in employment, in a selected industrial setting. The acoustics program in this school will be terminated, however, although students will continue to be able to take noise control courses.

G. Graduate Follow-up

Information is available regarding the graduate follow-up strategies of seven of the programs surveyed. In two of these programs, the faculty keep track of graduates informally only; they usually know a graduate's employment plans prior to graduation, and ask him/her to maintain contact. The remaining programs also rely on these methods, and utilize additional strategies, most commonly mailing questionnaires and/or newsletters periodically to former students. Most maintain files on the current addresses and employment status of their graduates. Formalized follow-up is in some cases carried out as a direct result of the requirements for achieving or maintaining accreditation.

II. ADDITIONAL FINDINGS

A. Recruitment Techniques

Students appear to become aware of noise-related degree-granting educational programs through a variety of avenues, according to data generated for this report. At the undergraduate level, students may take noise-related (acoustics, noise and vibration control, and/or audiology) courses as electives and as a result choose to complete additional courses in the field during their undergraduate studies. They may also subsequently elect such a concentration or major in graduate work. Undergraduates are also often attracted to noise programs within their own institutions as a result of these programs' high visibility and/or positive reputations. Several program officials have cited "word of mouth" by students as a very helpful means of attracting students from within the institution.

More formalized recruitment of students is prevalent among the graduate programs surveyed. Only one program, at the Massachusetts Institute of Technology, reportedly carries out no formal recruitment. The majority of the remaining programs surveyed advertise themselves in one or more ways to populations outside of their own institutions. The most common method appears to be the distribution of brochures, posters, and other descriptive materials to other colleges and universities, either locally only, or throughout the country. In some cases, these materials are descriptive of entire departments of which these programs are components, while in other cases they are specific to the individual program. The emerging Industrial Audiology program at the University of Tennessee sent descriptive program materials to students already enrolled in audiology and speech pathology. This generated considerable interest and caused several students to inquire further. Officials of one institution will in some cases actually visit other academic institutions in order to talk with prospective graduate students.

Distributing program materials and maintaining high visibility at national meetings and conferences in the noise field was mentioned by several sources as another helpful form of recruiting graduate level students. Reputation also appears to be a key factor in attracting graduate students from outside of the institution housing the program. An official of an audiology program has stressed the importance of publishing articles in journals as a means of establishing a positive reputation and attracting high caliber graduate students.

B. Research Funding and Sources of Student Financial Support

Phase II data indicate that the most prevalent form of financial assistance available to graduate students enrolled in these noise-related curricula is the research assistantship, and similar in-house work-study arrangements. The funding is often channeled through the Graduate School, or an established noise-related center or research body, e.g., the Center for Acoustical Studies at North Carolina State University (this center is entirely supported by external funds); the Noise Research Laboratory at the University of Tennessee, Knoxville; and the NASA Research Center in the case of the George Washington University/NASA acoustics program. At Memphis State University, the Speech and Hearing Center is contracted by local, state and federal social services agencies to perform services; graduate students receive stipends for assisting in providing these services. In most programs, advanced master's students and doctoral candidates may be eligible for limited numbers of teaching assistantships. One program official indicated that advanced doctoral students and those recently earning the Ph.D. are occasionally hired as research associates. The number of research and service-type assistantships available is typically strongly dependent upon the program's success in attracting external funding.

Most programs offer a very limited number of scholarships, which are awarded on a competitive basis. Usually all graduate level students in the Acoustics and Noise Control program at the University of Cincinnati are awarded tuition scholarships; many of these additionally hold teaching or research assistantships. The North Carolina State University noise program grants tuition remissions for out-of-state students. Other forms of financial assistance include fellowships (limited) and loans from various sources. University of Pittsburgh officials indicate that federal loans of up to $1,000 per year are available to students enrolled in schools of public health. Within the recently developed Industrial Audiology program at the University of Tennessee, efforts are under way to secure funding for students.

None of the noise program sources have indicated knowledge of any federal training grant monies available for any level of student in acoustics/noise control. Several have expressed the opinion that there is a need and justification for such a training grant program. The demand for graduates outweighs the number of graduates produced, and noise control is increasingly proving to be a widely underestimated, viable, and much-needed environmental/industrial field, in both research and the application of technology.

Federal training grant monies in audiology, speech pathology, and related disciplines are available through a number of universities offering degree programs in such fields. Funding is coordinated by the U.S. Department of Health, Education and Welfare, through the Bureau of Education for the Handicapped, Division of Personnel Preparation.

Research funding for the institutional programs surveyed has come from grants and contracts with both public and private organizations. Limited foundation support appears to be available. The federal agencies most often mentioned as sources of research support are the U.S. Navy (3), the Occupational Safety and Health Administration - NIOSH (3), the National Aeronautics and Space Administration (2), the U.S. Army (2), and the Department of Transportation (2). One program receives a small amount of research funding from the U.S. Environmental Protection Agency, and another holds a small EPA subcontract. One program official mentioned a state agency as a research funding source. Two programs reported having received funding from the National Science Foundation. Several programs receive more research funding from the private sector than from the public sector. Industries that have provided support include Allied Chemical Company, Tennessee Eastman Kodak, Kingsport Press, Arcada National Press, Mead Johnson, Pease Company, General Electric Corporation, Burlington Industries, Ford Motor Company, and Nelson Industries, Inc.

The types of noise-related research carried out vary dramatically. Broad areas of research reportedly conducted include the following: industrial noise (machinery and tools); surface vehicle noise; aircraft noise; the subjective response to, and the health effects of noise; auditory electrophysiology, psychology, physiology, pharmacology, and biochemistry; architectural acoustics and noise control; underwater acoustics; acoustic signal processing; and environmental site design for noise reduction. Various aspects of vibration and its control are also being researched to an increasing degree.

Interplay between the disciplines of audiology and acoustics has been observed in research activities in several respects. Acoustical engineering programs include the health effects of noise in research endeavors, while audiology programs are increasingly becoming involved in noise control in industry and the environment; moreover, in at least one instance, engineering and audiology programs are working cooperatively in the conduct of research. Via such an interdisciplinary cooperation, officials at North Carolina State University are studying and comparing the effects of noise on various population groups, e.g., male/female, black/white, and are observing differences in effects. Also noteworthy is research that was recently carried out at the University of Tennessee Noise Research Laboratory. Data have indicated that above-normal oxygen content in the air that is breathed has a beneficial effect on the rate of recovery to normal hearing after noise exposure. Additional research activities, as well as the equipment and facilities available to specific programs may be found within the individual program summaries.

Despite the wide variety and seemingly vast amount of research being carried out in the field, a number of officials have indicated that they feel the noise control field is being underserved with respect to research, as compared to the needs. Several federal agencies, according to sources, such as EPA and the Department of Transportation, have substantially reduced funding for noise control research (the DOT Department of Noise Abatement has recently disbanded). Also, the National Science Foundation reserves little or none of its research funding budget for the field of noise. For these and other reasons, these officials are not optimistic about an expansion of noise research, or even a maintenance of present levels, until public awareness and national priorities shift in favor of the noise control field.

C. Usage of ERIC and IRIS

ERIC and IRIS are federally maintained computer retrieval systems encompassing educational resource materials on a national scale. IRIS is an EPA generated compilation of information, and although its chief focus is potable water and wastewater, faculty sources in each program area were questioned regarding its use. Phase II was expanded to include an adjunct assessment of the utilization of IRIS and ERIC because the effectiveness of any such system can be measured by its application and use.

It should be pointed out that the respondents to the assessment question, "have you ever used ERIC or IRIS", were in all cases faculty members rather than students. The findings in Table 5 should be interpreted accordingly.

TABLE 5

ERIC/IRIS UTILIZATION PROFILE - NOISE

	Yes	No	Total Responding
ERIC	0	7	7
IRIS	0	7	7

One respondent noted that ERIC and/or IRIS may in fact be utilized by the departmental library as a portion of its literature searches. Another source reported the usage of computerized engineering literature searches, while a third also utilizes other undesignated literature scan services.

Of all the environmental areas surveyed in Phase II (air, noise, pesticides, potable water, radiation, solid waste, wastewater, and energy), the following depicts the total number of responses.

TABLE 6

ERIC/IRIS UTILIZATION PROFILE - PHASE II SUMMARY

	Yes	No	Total Responding
ERIC	72	307	379
IRIS	64	314	378

D. A Discussion of Program Flexibility

Phase II researchers, in an effort to compile data relative to the procedural, administrative, and developmental constraints in the modification of curriculum materials, posed the following questions to faculty members that were interviewed: "What is the time required to implement a complete content change in a course?", and "What is the time required to implement a complete change in a program?". For the definitions of a 'course' and a 'program' used for this study, the reader is referred to the TERMINOLOGY section of the Appendix.

The compilation of such information could provide useful and informative comparisons by degree level, by geographic location, and by other related variables. It can also provide insights into the flexibility or lack of flexibility in the development and modification of courses and programs. This information holds potential interest to those considering the development of curricula, to those currently offering, but considering the modification of curricula, and to potential funding sources.

The noise programs are, with but one exception, offered at the graduate level, and sources from programs offering multiple degrees indicated identical time frames for each degree level. Because of the limited sample of noise programs and a substantial number of non-responses, comparisons on other variables could not be considered valid.

The following tables present categorizations of responses to the curriculum flexibility questions. Each program has one response recorded for each degree level. The responses are to be considered the best estimates of these faculty members of the time frames required to complete the changes under "normal" conditions.

TABLE 7

TIME REQUIRED TO IMPLEMENT A COMPLETE CHANGE IN A COURSE

Degree Program	Less than 1 month	1 month to 1 year	More than 1 year; less than 2	2 to 4 years	More than 4 years	Undetermined
Bachelor	0	1	0	0	0	0
Masters	2	2	0	0	0	5
Doctoral	2	1	0	0	0	5
TOTAL	4	4	0	0	0	10

TABLE 8

TIME REQUIRED TO IMPLEMENT A COMPLETE CHANGE IN A PROGRAM

Degree Program	Less than 1 month	1 month to 1 year	More than 1 year; less than 2	2 to 4 years	More than 4 years	Undetermined
Bachelor	0	0	1	0	0	0
Masters	2	1	2	0	0	4
Doctoral	2	0	2	0	0	4
TOTAL	4	1	5	0	0	8

E. Environmental Occupations

During the interviews for Phase II, faculty members were questioned regarding occupations that their programs' graduates are qualified for upon completion of the degree. To verify data and maintain consistency, respondents were subsequently mailed occupational checklists specific to their program area(s); they were asked to indicate those occupations listed which their graduates are qualified to fill, and to add any additional occupations not already listed. This section summarizes the results of these components of the Phase II survey.

The only bachelor level program in noise that was identified and surveyed is the three-course sequence in acoustics and noise control at the University of Cincinnati. Program sources indicate that those persons earning the B.S. degree including this sequence are qualified for the following occupations:

Acoustical Engineer
Noise Control Specialist
Environmental Engineer
Industrial Engineer
Safety Engineer
Mechanical Engineer

These graduates are often hired as mechanical engineers, and are assigned to noise control in industries; they may also find employment with consulting engineering firms.

Graduate engineering programs in acoustics and noise control typically produce graduates qualified for the above occupations. Respondents have also indicated that master's and doctoral graduates are qualified for the following occupations:

Noise Control Consultant
Acoustical Physicist
Industrial Hygienist
Environmental Control Technologist
Pollution Control Specialist
Noise and Vibration Control Engineer

Very little difference was noted between master's and doctoral level occupations, although "acoustical physicist" was indicated for the doctoral level only. Doctoral graduates are also more likely to become employed within the academic community. Other work sites in which the master's and doctoral graduates become employed in the occupations listed above include public regulatory agencies, private consulting firms, and within corporate structures. Specific duties are highly contingent upon the choice of employment site, and the student's area of emphasis during the course of study. Possibilities include conducting basic and applied research in any aspect of acoustics/noise and vibration control, assessing occupational noise exposure and its effects, and designing and implementing noise controls at work sites and in the general environment. For details specific to each program, the reader is referred to the program summaries which follow.

According to sources in the audiology/industrial audiology programs surveyed, the M.A. and Ph.D. graduates from these programs are qualified for the following occupations:

Clinical Audiologist
Industrial Audiologist
Occupational Hearing Conservationist

Subcategories of audiology include diagnostic audiology and rehabilitative audiology. "Occupational Hearing Conservationist" is a certified occupations.

Clinical audiologists may be employed in offices of ear, nose and throat specialists, or otolaryngologists; in speech and hearing centers; in secondary and post-secondary schools; and in other agencies and clinics. Their duties may include identifying types and degrees of hearing losses, locating lesion sites, supervising hearing screening programs, and carrying out speech and language therapy. Industrial audiologists may work directly for an industry, or may perform their services as consultants on a contractual basis. Among their functions may be conducting sound measurement surveys, designing and implementing hearing conservation programs, evaluating the effects of employee exposure to noise, providing advice concerning ear protectors and other noise control equipment, training hearing test technicians, and serving as expert witnesses in court. In contrast to those graduating from engineering programs in noise control, the industrial audiologist is rarely able to make recommendations regarding engineering noise controls. Some audiologists are qualified to carry out environmental noise control functions, most often with regard to industrial noise.

F. Images of Environmental Programs Within the Institutions

Faculty members were asked, during Phase II, about the images of their programs and other environmental programs within their institutions. Five responses were received from noise program officials, all positive. Responses specific to noise programs included such phrases as "very high regard", "thought of highly", and "very good image". As the Industrial Audiology program at the University of Tennessee is quite recently developed, it is early to determine the program's image. However, student interest has been increasing rapidly. Those faculty members in noise control responding to the question regarding the general image of environmental programs indicated, in all cases, that environmental programs are highly respected within the institutions.

G. The Need for Additional Curriculum Materials

Three of the faculty members in noise programs interviewed have indicated that there are outstanding curriculum material needs in acoustics/audiology. One source indicated the need for a "good acoustics textbook", while another emphasized the need for the availability of a textbook containing a thorough, up-to-date treatment of noise control engineering; reportedly, none available have proven to be adequate, especially for job-related purposes. The third respondent, from an audiology program, would like to have available curriculum materials directly related to ambient noise levels, monitoring, and the remediation of noise-induced hearing losses.

H. A Discussion of Student/Graduate Communication and Financial Management Skills

During Phase I of the National Environmental/Energy Workforce Assessment, researchers noted that a large number of the persons interviewed, who employ environmentally trained/educated personnel, observed that many graduates are being produced who are deficient in the much-needed communication (oral and written) and financial management skills. During Phase II, faculty of the environmental/energy programs were questioned regarding their own attitudes on this subject in order to ascertain the consistencies or discrepancies in perceptions between academia and prospective employers of graduates.

Of those faculty members in noise-related graduate programs who responded to this question (4), all in engineering-based programs agreed that communication skills are a problem with students entering the programs. All of these programs attempt to deal with this problem by such means as requiring students to prepare technical reports and participate in oral presentations within specific courses, and by encouraging or requiring the development of a thesis or dissertation. Several hindrances exist, however, to the efforts to heighten student communication skills within engineering programs. These include: a) communications courses that may be chosen as electives are rarely geared toward the specific needs or purposes of engineering; and b) engineering programs have of late been under pressure to reduce the number of credits required for a degree, and as few engineering courses can be deleted, those courses such as technical report writing must often be eliminated from the curriculum.

A similar, though slightly less emphatic, response was elicited from engineering faculty regarding student/graduate financial management skills. Within most engineering departments, courses are available that deal directly and/or indirectly with engineering economy and financial management.

Faculty of audiology programs believe that their entering students for the most part do not have deficiencies in communication skills. Most graduate students come from undergraduate audiology or speech pathology programs which do not lack for courses in English, speech, and/or related subjects. Moreover, as the graduate audiology programs offer the Master of Arts degree, the students receive additional communications course work at the graduate level. Technical reports are also required for both undergraduates and graduate students in conjunction with clinical practicums. Data indicate that audiology programs provide less emphasis on financial management skills.

I. Methods Utilized by Faculty for Keeping Current in the Field

Noise program officials responded to the question, "how do you keep current in your field" most often mentioning affiliation with professional associations and participating in the national and state meetings and conferences sponsored by these associations (5 responses). Subscribing to professional journals was indicated as a method utilized by four faculty members, although one mentioned the time lapse between new developments and actual release of the information in the journals as a drawback. Conducting research was mentioned by several (3) respondents as a good way to keep abreast of the field. Consulting is helpful for keeping up with industrial problems, according to two sources. Finally, public service and instruction are each considered by one program official to be conducive towards keeping up-to-date in the field.

III

A Summary Profile of Representative Educational Programs

The following footnotes (1-6) refer to the various column headings of the Table. Other footnotes are specific to the figures which were provided by various institutions and are used throughout the Table.

[1]Enrollment	1976-77 statistics
[2]Graduates	average for last three years; 'change' indicated apparent trends within that three-year period
[3]Employment	'other' includes positions such as those found within the educational community
[4]Faculty	full-time and part-time is determined by individual institutions
[5]Internship/Applied Study	part of an option to obtain a degree; may or may not have financial reimbursement connected with it
[6]Graduate Follow-up	a standardized procedure that enables the institution to periodically determine the employment of their graduates
NA	Not Applicable/Not Available
*Asterisk	denotes that a program appears in more than one volume of the profile

TABLE

A SUMMARY PROFILE OF REPRESENTATIVE

STATE	INSTITUTION	PROGRAM	DEGREE	ENROLLMENT[1]		GRADUATES[2]	
				FULL TIME	PART TIME	No. / YEAR	CHANGE
GA	Georgia Institute of Technology	Acoustical Engineering	Adv. Cert.	N/A	N/A	3	Stable
MA	Massachusetts Institute of Technology	Acoustics	S.M.	8	0	4	Stable
			Sc.D. Ph.D.	8	0	2	Stable
NC	North Carolina State University	Noise and Vibration	M.S.	20	N/A	6	Up
			M.M.E.	0	0	0	Stable
			Ph.D.	10	N/A	3	Up
OH	University of Cincinnati	Acoustics and Noise Control	B.S.	30	0	30	Up
			M.S.	13	2	3	Stable
			Ph.D.	4	4	1	Stable
PA	Pennsylvania State University	Acoustics	M.E.	0	0	1	N/A
			M.S.	24	6	4	Up
			Ph.D.	23	0	4	Up
	University of Pittsburgh	Environmental(b) Health Engineering/Industrial Hygiene	M.S. M.P.H. D.S. Ph.D.	35	24	3	N/A
TN	Memphis State University	Audiology	M.A.	14	N/A	12	Up
			Ph.D.	3	N/A	1	Up
	University of Tennessee	Industrial(c) Audiology	M.A.	25	N/A	15	Up
VA	George Washington University/NASA	Acoustics	M.S.	2	7	3	Stable
			Sc.D.	1	2	1	Stable

(a) Includes industry and consulting combined.

(b) Student enrollment and faculty figures refer to the entire department of Industrial Environmental Health Science. The annual number of graduates includes the acoustics program only.

9

NOISE EDUCATIONAL PROGRAMS

STUDENT ORIGIN IN-STATE/ OUT-OF-STATE/ FOREIGN (%)	EMPLOYMENT				FACULTY[4]		INTERNSHIP/[5] APPLIED STUDY		GRADUATE[6] FOLLOW-UP	
	PRIVATE SECTOR INDUSTRY	PRIVATE SECTOR CONSULTING	GOV'T	OTHER[3]	FULL TIME	PART TIME	YES	NO	YES	NO
N/A	N/A	N/A	N/A	N/A	0	11		X		X
N/A		30%	40%	30%	18	0		X		X
66/33/NA	90%(a)	N/A	10%		8	6		X		X
N/A 77/23/- 75/25/-	75% 80% 80%	10% 5% 5%	10% 10% 10%	5% 5% 5%	9	3	X		X	
60/20/20	21%		46%	33%	9	19		X	X	
N/A	N/A	N/A	N/A	N/A	16	24	N/A		N/A	
80/20/NA	40%(a)	N/A	60%		5	10	X		X	
60/40/NA	80%	20%			5		X		X	
N/A	60%		40%		2	13	X			X

(c) Emerging program. Does not yet have students enrolled, so these figures are indicative of enrollment and graduates two years from now.

Photo reprinted from the
Michigan Technological
University Catalog 1975-76

PROJECT COMMENTARY

Photo reprinted from the
University of Missouri,
Columbia Bulletin 1977

PROJECT CONSTRAINTS

In preparation for the on-site interviews, all of the institutions' catalogs were intensively reviewed in order to determine where environmental programs were being offered. During the course of this study, 171 institutions were visited and a total of 338 environmental programs, representing 45 states and Washington, D.C., were surveyed in detail. Albeit significant, these programs represent only a portion of all such programs available and cannot be construed as an in-depth survey of all environmental programs. It is, however, a representative sample within each of the environmental pollution control areas of Air, Noise, Pesticides, Radiation, Water and Wastewater, Solid Waste and Energy.

Several constraining factors to the proposed comprehensiveness of the study were encountered while collecting data from the institutions. It was disappointing to find that definitive records or statistics were generally unavailable which would describe specifically the placement of environmental program graduates. General indications of placement within categories, such as government or industry, were often available in percentages only. Depending on the size of the program and its age, some contact people could describe all graduates, others knew only where the past year's graduates were presently employed, and still others were aware only of their advisees entry-level positions and subsequent moves.

It also became clear during the on-site interviews that some programs of similar or identical content had different titles. This lack of clarity within the environmental areas serves to confuse the casual reader. For that reason, attention must be directed to the actual environmental course listings included in each program summary.

A list of terms commonly used during the on-site interviews and subsequently in this report was developed in order to facilitate precise data gathering. The reader is directed to Appendix II, TERMINOLOGY.

No attempt was made, in this report, to qualitatively judge any of these programs. The apparent absence of substantial qualitative measures in the environmental education field in general and the desire to collect data in a neutral atmosphere underscore the reasons for this omission. It appears that there is a need for the development of an environmental program model in each of these areas in order that some qualitative standards be provided where none now exist.

PROJECT COMMENTARY

This report presents data on nine noise-related degree programs in the United States (seven in acoustics and noise control, and two in audiology), as well as on two non-degree noise training programs. The degree programs are chiefly offered at the graduate level.

The acoustics/noise control programs focus mainly on theoretical and applied acoustics, vibration, acoustical and mechanical measurement, and the control of noise and vibration. The audiology programs concentrate on the anatomy and physiology of hearing, diagnosis of hearing disorders, rehabilitation and other corrective procedures, psychological factors, and instrumentation. They also include hearing conservation in industry, and to a lesser extent, in the general environment. Phase II sources indicate that the occupations that acoustics programs most commonly train students for include acoustical, environmental, industrial, safety, mechanical, and noise and vibration control engineer; noise control, and pollution control specialist; noise control consultant; acoustical physicist; and environmental control technologist. Graduates of the audiology programs are qualified to enter the occupations of clinical and/or industrial audiologist, and Occupation Hearing Conservationist (a certified occupation).

Data indicate that of the graduates of the programs surveyed, 58 percent accept positions in the private sector and 30 percent become governmental employees. A large portion of the remainder join the academic community. In most cases, graduate follow-up is carried out informally.

Over half (55 percent) of the 157 faculty members who contribute to these degree programs do so on a part-time basis. Four of the programs include an applied study term as an integral part of the curriculum. Also, many students receive research experience, and are financially supported by assistantships (research or other). Less common are fellowships and scholarships. The training grant is rarely available to students of noise programs, although officials have suggested the need for such an arrangement.

Other Phase II findings for the noise control programs surveyed include:

1) the majority of the programs carry out student recruitment, most often mailing descriptive materials to other colleges and universities;
2) research funding comes from grants and contracts with both public and private organizations, and research activities vary widely. Several program officials believe that the noise control field is being underserved with respect to research funding;
3) none of the faculty members utilize IRIS or ERIC, although several report the usage of other literature scan services;
4) in all cases, faculty members report that it takes one year or less to implement a complete change in a course, while implementing a complete change in a program in over half of the cases takes one to two years;
5) officials report that their programs, and other environmental programs, are highly respected within their institutions;
6) several sources have noted the need for additional curriculum materials, specifically in acoustics, noise control engineering, ambient noise levels, monitoring, and the remediation of noise-induced hearing losses;
7) engineering program officials believe that entering students are deficient in communication skills, and they attempt to remediate this situation, while audiology officials do not note this deficiency in their students.

The majority (ten of seventeen responses) of the faculty members reported that their enrollments have remained stable over the last three years; the remainder have experienced enrollment growths. In one case (the University of Pittsburgh), the acoustical environmental control program will be discontinued, although noise-related courses will continue to be offered. Of the remaining six acoustical programs, three project stable enrollment for the next three years, and three project expansion. The reason most often mentioned for stability is lack of funding for research, for supporting students, and for purchasing the necessary equipment. Although North Carolina State University projects program growth, officials indicate that this expansion will be contingent upon the availability of additional monies.

The Georgia Institute of Technology will continue to expand upon the multidisciplinary curriculum approach, and The Pennsylvania State University has increased its emphasis on environmental acoustics, while decreasing its emphasis on the defense aspects. They will also continue to focus on ultrasonics. Several programs reportedly will increasingly focus on vibration.

The Industrial Audiology program at the University of Tennessee is expected to increase its enrollment as the program develops and becomes fully functional. The Memphis State doctoral audiology program is expected to increase slightly in enrollment, while the master's program is projected to maintain current enrollment levels.

Nearly all of the officials interviewed believe that the future demand for professionals trained in noise control will increase (with judgements ranging from moderately to dramatically), because of the demonstrated needs. However, current growth hindrances include the lack of regulatory legislation and the paucity of funds. The field of hearing conservation is also expected to grow, creating demands for trained personnel in industry and in health-related agencies. Awareness of adverse noise effects is increasing, which is demonstrated by the growing number of noise-related litigations. One source has stated, however, that OSHA will continue to lose cases because it often cannot prove that feasible technology is available. The continued development of technology requires continued effort, which requires the availability of funding.

Phase I of the National Environmental/Energy Workforce Assessment demonstrated that the total state noise control workforce is expected to increase by nearly 100 percent (139 to 235) by 1982. These estimates include only those agencies concerned with environmental noise, not occupational noise. Similarly, the EPA noise control workforce is expected to grow by 129 percent (from seventeen to thirty-nine) within the next five years. It should be emphasized that although the projected increases, when expressed in percentages, may appear phenomenal, in five years the public sector noise control workforce is expected to comprise only 1 percent of the total state and EPA environmental workforce, an increase of 0.2 percent over this time frame. Data have indicated, however, that the most demand for growth will be within the private sector.

Sources interviewed in Phase I indicated that persons qualified to work in noise control are difficult to locate; Phase II faculty members also noted that graduates of their programs typically receive many employment offers from both the private and public sectors, and that many jobs in the field remain vacant for lack of qualified persons to fill them. Given the Phase I projections and the educational programs' dependency on additional financial support and legislation, the likelihood that job market demands will be met within the next three to five years does not appear to be good. This situation will most certainly retard progress in controlling environmental noise, and noise exposure in the work place.

LIST OF NOISE TRAINING INSTITUTIONS BY DEGREE

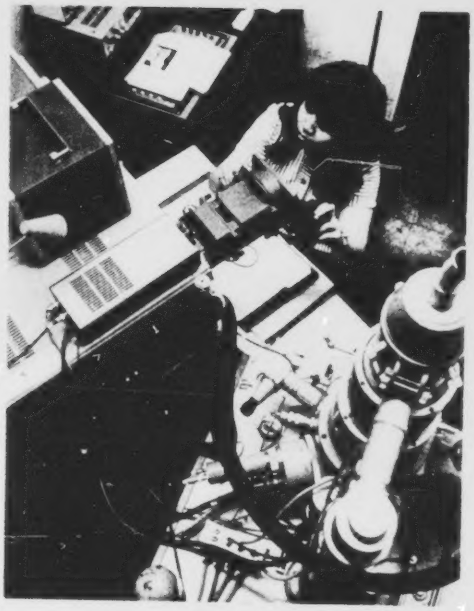

Photo reprinted from the Illinois Institute of Technology Booklet

LIST OF NOISE TRAINING INSTITUTIONS BY DEGREE

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BACHELOR/MASTERS/DOCTORAL

University of Cincinnati 95

MASTERS

University of Tennessee, Knoxville 99

MASTERS/DOCTORAL

George Washington University 103
Georgia Institute of Technology. 107
Massachusetts Institute of Technology. 111
Memphis State University 115
North Carolina State University. 119
Pennsylvania State University. 123
University of Pittsburgh 129

NON-DEGREE PROGRAMS

Florida Department of Environmental Regulation 135
University of Tennessee Center for Health Sciences 139

NOISE

TRAINING SUMMARIES

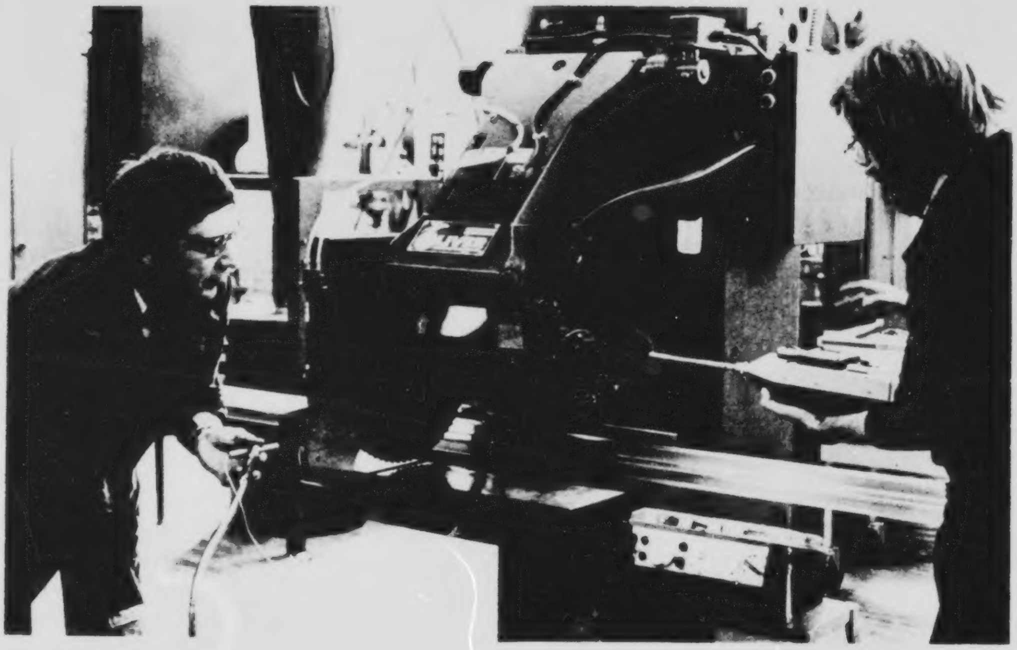

Photo reprinted from the 1976-77 Annual Report, Engineering Experiment Station, College of Engineering, University of Wisconsin, Madison

INSTITUTION: UNIVERSITY OF CINCINNATI

PROGRAM: Acoustics and Noise Control

DEPARTMENT: Mechanical and Industrial Engineering

DEGREE: B.S. in Mechanical Engineering
M.S. in Mechanical Engineering
Ph.D. in Mechanical Engineering

CONTACT: Dr. Ivan E. Morse
Mechanical and Industrial Engineering Department
College of Engineering
University of Cincinnati
Cincinnati, Ohio 45221
(513) 475-2783

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

The University of Cincinnati's Department of Mechanical and Industrial Engineering offers graduate study and research in kinematics, dynamics, vibrations, thermodynamics, heat transfer, fluid mechanics, control systems, engineering design, acoustics, energy conservation, and solar energy. According to the College of Engineering catalog, "Graduate work in this Department is characterized by breadth of study and flexibility in programs. Emphasis is placed on designing individual programs of study which meet the needs and further the professional objectives of the student".

Undergraduate seniors can take a three-course sequence in acoustics and noise control, but the major thrust of the department in these areas comes at the masters and doctoral levels. The early 1960s brought an awareness of the importance of structural vibration as the source of most noise control problems in machine tools and industrial equipment. Research and coursework followed in the latter half of that decade and in the early '70s. Today's graduates, with specialization in acoustics and vibration, are hired as mechanical engineers assigned to noise control in industry or utilized in the private sector in consulting firms.

The program in noise at the University of Cincinnati receives very little support from the government; rather, most of its research funding and sometimes its equipment comes through industrial contracts (e.g. design of noise-insulated offices for placement in factory areas). These contracts represent on-the-job training for students and help staff members to remain current in the field. Faculty members are also engaged in presentations of seminars and short courses on noise, vibration, and acoustics (e.g., short course on modal analysis, theory, and measurement with Hewlett-Packard).

Research facilities consist of various vibration/acoustic measurement and analysis equipment including a digital Fourier computer analysis system and an anechoic chamber currently under construction by students and staff; the latter represents a laboratory valued at $150,000 built for $10-12,000.

PROGRAM REQUIREMENTS

Admission to graduate study in Engineering is granted, upon recommendation of the appropriate department, to those applicants who hold baccalaureate or master's degrees and who present evidence of potential ability for high scholarship, advanced study, and research. To obtain an M.S. degree in Mechanical and Industrial Engineering, a student must complete a minimum of 45 graduate quarter hours. The latter half of these credits, exclusive of research credits, shall be earned while in residence at the University of Cincinnati. Students whose undergraduate training has been insufficient should expect to spend more than one year fulfilling the requirements for the degree.

The Ph.D. degree is granted for no less than three years of full-time graduate study or its equivalence (a minimum of 135 graduate credits--the last 45 inclusive of research--must be completed at the University of Cincinnati). The student is required to present a dissertation which shows high scholarly achievement through independent research.

CURRENT FACULTY, STUDENTS, GRADUATES

The staff involved in the noise and vibration program within the Department of Mechanical and Industrial Engineering consist of four full-time teaching professors, two full-time instructors, three full-time research associates, and 3-4 one-third-time graduate assistants (laboratory and teaching assistance). There are 13 full-time and two part-time M.S. and four full-time and 4 part-time Ph.D. candidates pursuing noise and acoustics programs; all are male. All graduate students have tuition scholarships and many hold teaching or research assistantships or instructor positions. The program does not attract career-change students as much as it draws engineering students and professionals who desire some specialization.

The number of graduates annually in noise and vibration--three M.S. and one Ph.D.--is relatively stable. Roughly 30-50 percent of the master's degree graduates pursue a doctorate. The job market is good with 90 percent gaining employment in their field of training; 85 percent work in the private sector, 10 percent work for government, and 5 percent take university jobs.

PROGRAM PROJECTIONS

The personnel needs in the noise field are great, especially in industry. Expectations are that by 1978, there will be an overview course in noise and acoustics for senior undergraduates. Department personnel note the recent attention given by the Environmental Protection Agency to studies of noise-reducing elements for noise-producing agents (e.g., trucks, heavy machinery) as evidence of a growing national concern for noise pollution.

Currently, the University of Cincinnati is increasing its efforts in seeking financial support from many sources for extension of its research activities in this and other areas. Additionally, the Department is seeking funds to implement an innovative educational program involving mini-computer-based equipment for the real-time acquisition, analysis, and presentation of dynamic characteristics of physical system.

Economic considerations affect the future of the department in several other areas, too. The addition of a computer-based system for measuring vibration in materials and equipment would allow students to learn principles and practical application simultaneously, but such a system remains too costly for many educational institutions to purchase. Financial conditions at the University of Cincinnati will not permit the addition of faculty or staff in the next five years though such personnel are needed. And, research monies must continue if graduate students and research associates are to be funded.

COURSE DESCRIPTION

Advanced Undergraduate and Graduate Courses:

20-263-662 Mechanical Vibrations II - Continuation of Mechanical Vibrations I with emphasis on multi-degree of freedom, lumped parameter, and continuously distributed systems; transient vibrations. (3 q.h.)

20-263-666 Acoustics I - Elements and general properties of waves and wave motion. Harmonic analysis, waves in continuous media. (3 q.h.)

20-263-667 Acoustics II - Reverberation, speakers, speech and hearing; noise analysis techniques involving analog and digital filtering, correlations, and coherence. (3 q.h.)

20-263-668 Acoustics III - Student projects in applied acoustics. Seminars on current topics and/or "state-of-the-art" experimental subjects. (3 q.h.)

20-263-695 Mechanical Vibrations III - The Holzer, Rayleigh, Stodola methods for natural frequencies, frequency and transient response, mode shapes; transfer function analyzer, exciters, transducers. (3 q.h.)

20-263-696 Mechanical Vibrations III Laboratory - Experimental techniques for dynamic evaluation of mechanical systems, natural frequencies, mode shapes, real time and fast Fourier analyzers; exciters; transducers. (1 q.h.)

Graduate Courses:

20-263-760 Application of Fourier Transform Technique in Engineering - Time, frequency, s-domain relationships, Fourier series and transform, LaPlace and Z-transforms. Application to vibration, noise control, heat transfer problems. (3 q.h.)

20-263-780 Advanced Mechanical Vibration I - Analysis of elements of continuous systems such as beams, plates, etc. Stress waves. (3 q.h.)

20-263-880 Advanced Mechanical Vibration II - A study of damping, transients, and shock spectra. Characteristics and influence of nonlinear elements on free and forced responses. (3 q.h.)

794, 795, 796 System Dynamic Analysis I, II, III - Advanced analytical experimental methods to determine dynamic performance of complex mechanical systems. Analysis equipment and computer software are used. (3 q.h. each qtr.)

INSTITUTION: UNIVERSITY OF TENNESSEE

PROGRAM: Industrial Audiology
DEPARTMENT: Audiology and Speech Pathology
DEGREE: Master of Arts (M.A.)

CONTACT: Dr. David Lipscomb
Department of Audiology and Speech Pathology
University of Tennessee
Knoxville, Tennessee 37916
(615) 974-4123

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

This program is currently being initiated in response to the need for professionals trained not only as clinical audiologists, but also as industrial audiologists. This dual clinical/industrial emphasis is an important feature of this option because it insures the high degree of professional excellence, as required for the American Speech and Hearing Association's (ASHA) Certificate of Clinical Competence, and it provides sufficient application to the industrial setting as to allow competency in hearing conservation program development.

The function of an industrial audiologist as described by program officials is fourfold. It is first, to design and implement hearing conservation programs; second, to conduct sound measurement surveys; third, to evaluate the level and effect of employee exposure to noise; and fourth, to train industrial hearing test technicians. In addition to being qualified to work as industrial audiologists, these graduates are prepared to work as consultants, Occupational Hearing Conservationists (a certified occupation), or as certified clinical audiologists.

Industry has indicated a tremendous interest in a program such as this. Commonly large fines are levied against industries for non-compliance with OSHA requirements. This occurs in part because businesses simply do not have the expertise at their disposal to cope with the problem of excessive noise exposure. Another strong feature of this program is that a portion of the student's clinical practicum (for fulfillment of requirements for ASHA's Certificate of Clinical Competence) will be taken in an industrial setting.

The University of Tennessee is uniquely qualified to begin a program such as this as evidenced by their nationally prominant Noise Research Laboratory. Both the faculty and the facility are widely recognized for their excellence in the field of audiology and in particular for their study of the effects of noise in the environment on hearing.

PROGRAM REQUIREMENTS

In order to be admitted to this program one must have a Bachelor of Arts or a Bachelor of Science degree and have taken the Graduate Records Examination. Students who do not have sufficient undergraduate hours in audiology are required to make up their deficiencies.

The M.A. necessitates a 3.0 cumulative grade point average for a minimum of forty-five quarter hours, half of which must be at or above the five thousand level (as shown in the university catalog). Nine of those hours are for thesis research. A non-thesis option requires a minimum of forty-eight quarter hours and completion of written comprehensive examinations. The industrial option requires a total of sixty-six to seventy-six quarter hours.

Prior to declaring an area of emphasis, successful completion of a core of courses is required. This core is designed to meet academic and professional requirements for clinical certification from ASHA in audiology. Courses cover the topics of anatomy and physiology of the human auditory mechanism, diagnosis of auditory disorders, clinical practice in audiology, aural rehabilitation (i.e., speech reading and auditory training), statistics, impedence measurement in audiology, audiological research techniques, sound measurement and analysis, hearing aid evaluation, physiological acoustics, speech, and hearing instrumentation.

Upon completion of the core, one may elect to continue in the clinical program or may specialize in industrial audiology. The industrial program requires training in pediatric audiology, medical audiology, advanced audiological procedures, and then a series of seven specifically option-related courses dealing with environmental noise, industrial safety, hearing conservation, epidemiology, occupational health and safety, and on-site experience in hearing conservation.

CURRENT FACULTY, STUDENTS, GRADUATES

Five of the full-time audiology faculty are involved with this program, to a lesser degree now than once the program is in full operation. Approximately 60 percent of the faculty effort is directed toward teaching responsibilities and 40 percent to research. Three of the current faculty have their Hearing Test Technician or program director status as awarded by the Council for Accreditation of Occupational Hearing Conservationists.

At this time the only way to estimate how well received this program is, or will be, is to observe the enrollment in the Introduction to Hearing Conservation Course and to evaluate the response to a questionnaire which circulated around the department asking students to register their interest in enrolling in such a program. Five students have completed the course (two from the Department of Occupational Health and three from audiology). Of the three audiology students, two are still enrolled and one has graduated and is employed in a safety consultant firm in New Mexico as a hearing conservation consultant. In response to the survey in October of 1977, eleven of the graduate students expressed a desire to obtain practical experience in industrial hearing conservation measures, ten of these would like additional course work, and eight have expressed a desire to pursue hearing conservation as a professional career.

Although enrollment estimates are purely speculative it is anticipated that within two years there will be around twenty-five students enrolled in this track and there will be approximately ten to fifteen graduates each year.

PROGRAM PROJECTIONS

While nearly all the information contained in this summary can be described as projective, plans exist to expand the Department of Audiology to include five separate tracks; one in hearing aid dispensing, one in audiological habilitation, one in clinical diagnostics, one in research, in addition to the one in industrial audiology which has already been approved and is moving toward becoming completely operational. It is fully expected that the track in industrial audiology will provide a model for subsequent programs of like kind in other places.

COURSE DESCRIPTION (SELECTED)

4220 Environmental Noise (Department of Mechanical Engineering) - Basic principles of acoustics - measurement and control of noise in industrial and community environments. (3 q.h.)

4750 Noise in the Environment - Extent to which noise problems exist, introduction to noise measurement, basic techniques in sound and vibration abatement, acoustical factors, and physiological concomitants in noise stimulation. (3 q.h.)

4760 Introduction to Hearing Conservation - Roles of noise-hazard evaluation, medical monitoring, health education, hearing protective devices, administrative controls and acoustical engineering controls in hearing conservation. (4 q.h.)

4950 Industrial Safety (Department of Industrial Engineering) - Development of organization and program for prevention and control of accidents with emphasis on OSHA rules and regulations. (3 q.h.)

5120 Occupational Health and Safety (Division of Health and Safety) - First half of a two part course concerned with health and safety theory and practice related to overall improvement of community health and safety. (5 q.h.)

5410 Epidemiology (Division of Health and Safety) - The study of incidence of disease in man. (3 q.h.)

5450 Sound Measurement and Analysis in Hearing Conservation - Study of noise measuring systems and techniques. Survey of factors in military and industrial audiology, and study of role of audiologist in industry. (3 q.h.)

5490 Practicum in Hearing Conservation - Supervised on-site experience in hearing conservation program in industrial setting. (1-6 q.h.)

INSTITUTION: GEORGE WASHINGTON UNIVERSITY - NASA

PROGRAM: Acoustics

DEPARTMENT: Joint Institute for Advancement of Flight Sciences

DEGREE: Master of Science (M.S.)
Doctor of Science (D.Sc.)

CONTACT: John E. Duberg
Director, Joint Institute for Advancement of Flight Sciences
Mail Stop 169
NASA - Langley Research Center
Hampton, Virginia 23665
(804) 827-2664

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

The acoustics program began in 1969 as a joint effort between George Washington University's School of Engineering and Applied Science and NASA's Langley Research Center. In 1971, with the formation of the Joint Institute for Advancement of Flight Sciences, the acoustics program became an integral part of the Institute's research and education program. A similar program is offered at NASA's Ames Research Center in Mountain View, California.

The program, which is taught by both full-time and part-time faculty of George Washington University's School of Engineering and Applied Science, is administered as an off-campus program by the College of General Studies and offered at the Langley Research Center.

Funding for the program comes primarily from NASA and is supplemented with a grant from the U.S. Army's Research Office in Durham, North Carolina. Facilities available for program use include the extensive research laboratories of NASA at Langley Research Center. These include an anechoic chamber, a reverberation chamber, a flow duct acoustics facility, an acoustic physics lab, and a simulation lab.

PROGRAM REQUIREMENTS

Admission to the Master's program requires a Bachelor's degree from a recognized institution with a major in engineering or physics generally preferred. To enter the doctoral program, an appropriate Master's degree is required. It is also possible for non-degree students to take courses in either program with the approval of the department.

The M.S. degree requires a minimum of twenty-four semester hours of approved courses and a thesis equivalent to six semester hours. With department approval, a student may select an optional program which requires a minimum of thirty-three hours of credit and no thesis.

Requirements for the Ph.D. include a minimum of thirty semester hours of course work beyond the M.S., a reading knowledge of one foreign language, preferably Russian, satisfactory completion of a qualifying exam, a dissertation equivalent to at least twenty-four semester hours, and passing of the final oral exam.

CURRENT FACULTY, STUDENTS, GRADUATES

The current faculty consists of fifteen members, all part-time and primarily researchers. Four of them teach primarily acoustics and the remaining eleven teach fundamental subjects applicable to several programs. Faculty members are drawn from both George Washington University School of Engineering and Applied Science and research scientists and engineers at NASA's Research Center.

Nine students are currently enrolled in the program, two full-time and seven part-time, and most are also working at the NASA Research Center. Recruitment is generally accomplished through NASA training announcements although some recruiting is also done at local colleges. Most students receive some form of financial support, primarily through the NASA work-study program for employers or through research scholar assistantships available from George Washington University.

Generally there are two or three graduates each year and most go directly into employment, usually in either the aircraft industry or at NASA. Placement is not considered to be a problem since most students are already employed while pursuing the program.

PROGRAM PROJECTIONS

It is anticipated that the program levels will remain stable with no anticipated increase in faculty or students, It is unlikely that additional faculty would be hired in any case, since the NASA Research Center already employs several hundred researchers from which to draw upon for teaching.

ADDITIONAL INFORMATION

The staff of the acoustics program regularly conducts a noise control conference for interested technical persons, from both private industry and the government.

COURSE DESCRIPTION

(the following is a partial listing of courses)

270 Theoretical Acoustics I - Basic acoustic theory in stationary and uniformly moving media; waves in infinite space; sound transmission through interfaces between layered media and between media in relative motion; sound radiation from simple solid boundaries, source and dipole fields; propagation inducts and enclosures; elements of classical absorption of sound. (3 s.h.)

274 Noise and Vibration Control - Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise; ventilation systems noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. (3 s.h.)

275 Theoretical Acoustics II - General theory of sound propagation in homogeneous media, viscous and heat conduction effects; methods of solving the inhomogenous wave equation; theory of sound radiation, sources, dipoles, quadrupoles; radiation from moving sources; scattering and diffraction of sound by obstacles; introduction to acoustics of inhomogeneous media, geometric acoustics. (3 s.h.)

276 Acoustical and Mechanical Measurements - Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. (3 s.h.)

277 Physical Acoustics - Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. (3 s.h.)

278 Psychological and Physiological Acoustics - Auditory system and its response to sound, experimental methodology in psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. (3 s.h.)

279 Human Factors in Engineering - Man-machine interface, effects of physical stresses on human behavior and performance, life support system, learning and conditioning of physical stresses. (3 s.h.)

280 Special Topics Acoustics - Current methods and problems in acoustics. Topics chosen from aerospace noise generation and control, and other areas. (3 s.h.)

310 Aeroacoustics - General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise. Current problems in aeroacoustics. (3 s.h.)

311 Nonlinear Acoustics - Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing wall. (3 s.h.)

312 Theory of Random Vibration - Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement and application. (3 s.h.)

313 Structural Acoustic Interaction - Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structures, sound transmission through structures. Panel response to turbulent boundary layer excitation. Sound radiation from mechanically excited structure vibration. (3 s.h.)

INSTITUTION: GEORGIA INSTITUTE OF TECHNOLOGY

PROGRAM: Acoustical Engineering

DEPARTMENT: College of Engineering (Multidisciplinary)

DEGREE: Certificate of achievement and Master of Science (M.S.), Doctor of Philosophy (Ph.D.)

CONTACT: Dr. Charles R. Vail, P.E., Associate Dean
College of Engineering
Georgia Institute of Technology
225 North Avenue, N.W.
Atlanta, Georgia 30332
(404) 894-3354

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

The College of Engineering offers students majoring in the standard engineering disciplines (i.e., aerospace engineering, electrical engineering, engineering science and mechanics, industrial and systems engineering, mechanical engineering, nuclear engineering, textile engineering, and architecture) the opportunity to choose their electives in such a way as to allow them to qualify for a certificate of achievement in acoustical engineering.

The multidisciplinary acoustical engineering program enables the graduate student to bring the expertise of his or her disciplinary major to bear on problems in the broad area of acoustics. A choice may be made between specialization in a particular area such as noise control, or pursuit of a broad area such as environmental noise management.

Courses are offered in theoretical acoustics, aerodynamic noise, architectural acoustics, audio engineering, environmental noise management, industrial noise control, underwater sound, and psychoacoustics. Related courses exist in the areas of vibration control, wave propagation and seismology. Current research opportunities exist in the fields of machinery noise, combustion noise, aerodynamic noise, helicopter noise, atmospheric acoustics, propagation through multiphase media, environmental site design for low noise, near field/far field relationships, subjective response to noise, and the effects of noise on human performance.

Students who wish to fulfill the certificate requirements must complete a traditional engineering curriculum in one of the eight previously listed disciplines. They must also complete the specific requirements for acoustical engineering. Four components compose all of the multidisciplinary programs. The first is Methodology, in which the student meets the modeling, systems analysis and design requirements of the College of Engineering. The second is called the Problem Area (i.e., acoustical engineering), which calls for the completion of the specialized certificate program. The third aspect is the Supporting Area, which comprises the required courses specific to one's "home" department. The last component is the Thesis or special problem area.

PROGRAM REQUIREMENTS

Full graduate standing will be accorded applicants holding a bachelor's degree from an approved institution and whose previous work has been of a nature and quality sufficient to offer reasonable assurance of success in advanced study. A conditional graduate standing will be assigned to those entrants whose previous work shows deficiencies in either content or quality.

The minimum number of quarter credits which are required for the master's degree is fifty. Students have the option of preparing a thesis or of not preparing one. The latter instance necessitates that the student do a special project and register for additional course work.

Recalling the four components of the multidisciplinary degree programs, the first area is constructed of four courses, which are: Aerospace Engineering (AE) 6750 - Systems Design Methodology, AE 6751 - Complex System Design I, and Mechanical Engineering (ME) 6424 and 6425 - Feedback Control System I and II. The problem area includes twelve credits of AE 6760 - Engineering Acoustics I, AE 6763 - Noise Reduction and Control, Architecture 6351 - Advanced Architectural Acoustics, and City Planning 6160 - Environmental Noise Management. Twelve credits, minimum, must be in one's department in support of a particular discipline. Finally, a student must elect to complete a thesis or a special project.

Similar problem area courses are necessary for one to receive a certificate at the Ph.D. level. The doctoral student must also meet all requirements for this degree in his/her respective school of engineering. A minimum of three successive quarters in residence are stipulated, as well as the completion of a "searching and authoritative investigation" of a special area culminating with the writing of the dissertation.

CURRENT FACULTY, STUDENTS, GRADUATES

Acoustical engineering is administered by one faculty member from each of the eight cooperating departments. In addition, one faculty each from civil engineering, physics, and psychology are on this administrating committee in anticipation of their departments offering acoustical certificates soon.

Students do not announce that they are pursuing certificates until the quarter before they graduate, so it is not possible to estimate how many students are involved. Three acoustical certificates were awarded in both 1976 and in 1977 to graduates of the master's program in electrical engineering. One was given in the Department of Industrial and Systems Engineering, and one in mechanical engineering at the master's level. One graduate of the Ph.D. program in mechanical engineering has received an acoustical certificate. No follow-up study of where the certificate recipients found employment has been conducted but it is assumed that they are in demand by both industry and government.

PROGRAM PROJECTIONS

The multidisciplinary approach to a particular problem area appears to be an important development in environmental education, and is creating something of a "stir" among industrial representatives. Programs such as these are being expanded in this department to create cross-departmental programs in which the third component, or supportive courses, will be taken from three departments which are complementary in nature. Officials expect to continue expansion of the multidisciplinary program.

COURSE DESCRIPTION

Arch 6351 Advanced Architectural Acoustics - Design requirements for noise control and acceptable room acoustics. Practical design problems, materials selection and calculation of sound propagation parameters. (3 q.h.)

C.P. 6160 Environmental Noise Management - Management and administration of environmental or community generated noise, analysis of noise impact, noise management, instrumentation, rating methods. Evaluation of laws and management programs. (3 q.h.)

Math 4320 Complex Analysis - Topics from complex function theory, including coutour integration and conformal mapping. (3 q.h.)

Math 4347 Introduction to Partial Differential Equations - Second order linear differential equations, including the wave equation. Properties of parabolic and eliptical equations. The method of separation of variables. Fourier series. Green's function. (3 q.h.)

Math 4348 Introduction to Partial Equations - A continuation of Math 4347. Sturm-Liouville theory and general Fourier expansions, Green's functions, elementary theory of analytical functions of a complex variable. (3 q.h.)

M.E. 6424 Feedback Control Systems I - Linear systems. Integration of classical (root lucus, frequency response) and modern (state feedback, observers) techniques. Mechanical, thermal, fluid, chemical, and nuclear examples. (3 q.h.)

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A.E. 6000 Foundations of Fluid Mechanics - Development of conservation equations of multicomponent, reacting fluid from both continuum and molecular viewpoints. Stress tensor, heat transfer vector and diffusion velocity. (3 q.h.)

A.E. 6020 Elements of Compressible Flow - Defining equations for inviscid compressible flows, method of characteristics for unsteady one-dimensional and steady two-dimensional and axially symmetric flows, nozzle design, conical flow. (3 q.h.)

A.E. 6031 Advanced Potential Flow II - Formulation of aerodynamic influence coefficients, solutions to subsonic, supersonic and hypersonic flow problems of wings and bodies experiencing oscillatory and arbitrary motions. (3 q.h.)

A.E. 6460 Aerodynamic Noise - Jet, boundary layer, combustion, propeller and fan noise. Sonic boom, noise propagation from engines and attenuation techniques. (3 q.h.)

A.E. 6750 System Design Methodology - Relationship of technological systems to society is studied using economic concepts. Emphasis on use of engineering type analysis in resolving value laden problems. (2 q.h.)

A.E. 6751 Complex Systems Design - This two-quarter sequence permits students from all schools to meet, form an interdisciplinary team and carry out a preliminary design of a significant, complex system. (2 q.h.)

A.E. 6760 Engineering Acoustics I - Introductory analytical methods, stochastic processes, the wave equation in a compressible fluid and problems in the radiation of sound. (3 q.h.)

A.E. 6761 Engineering Acoustics II - Sound reflection and refraction, scattering and diffraction, sound radiation and duct acoustics. (3 q.h.)

A.E. 6762 Engineering Acoustics III - Advanced duct acoustics, wave dispersion and attenuation, acoustics in moving media, geometrical acoustics, nonlinear acoustics. (3 q.h.)

A.E. 6763 Noise Reduction and Control (Industrial Applications) - Methods of noise reduction and control applied to systems in industry. Measurement of sound power, material acoustic properties, barriers, enclosures, mufflers, vibration reduction and damping methods. (3 q.h.)

A.E. 6764 Ocean Acoustics - Propagation of sound waves in the oceans, stress-strain relationships, asymptotic ray theory. Propagation in shallow water and deep water. (3 q.h.)

INSTITUTION: MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PROGRAM: Acoustics

DEPARTMENT: Interdepartmental

DEGREE: Master of Science (S.M.)
Doctor of Science (Sc.D.) or Doctor of Philosophy (Ph.D.)

CONTACT: Dr. Richard H. Lyon
Department of Mechanical Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139
(617) 253-2214

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

Acoustics is an interdepartmental program, administered by a committee composed of members from the departments of Mechanical Engineering, Ocean Engineering, Electrical Engineering and Computer Science, Aeronautics and Astronautics, and Architecture. The program originated in 1946, was dropped in the mid-1950s and revived in the mid-1960s.

Students can enter the program by registering in one of the participating departments or by the creation of a special committee with representatives of appropriate departments. Degrees may be granted by the student's department, with a specialty in acoustics or may be unspecified.

Research support for the program is provided by the Acoustics and Vibration Laboratory, operated jointly by the Departments of Mechanical Engineering and Ocean Engineering.

PROGRAM REQUIREMENTS

Since acoustics is an interdepartmental program, students must meet the admission requirements of their respective departments. General Institute requirements for admission to the S.M. program include a Bachelor's degree or equivalent from an acceptable college, university, or technical school along with demonstration of the ability to accomplish a program of study and research. Entry to the Sc.D. and Ph.D. programs generally require the student to meet the qualifications for a Master's degree.

The degrees are awarded by the student's department and may have the departmental designation, be designated in acoustics, or be unspecified. Degree requirements are the same as those for the department granting the degree or must be approved by the student's special faculty committee. General requirements for the S.M. degree include the completion of a minimum of sixty-six units of credit plus a thesis. The Sc.D. or Ph.D. program requires the completion of a program of advanced study including a general examination, and completion and oral defense of a thesis an original research. Sc.D. and Ph.D. degrees are awarded interchangeably and a student may select either one.

CURRENT FACULTY, STUDENTS, GRADUATES

Eighteen faculty members are currently participating in the program on a part-time basis. Thirteen of these spend an equal amount of time in both teaching and research. The remaining five devote all time to research. All program faculty are assigned to one of the participating departments. Research funding in acoustics is provided by several sources including the National Science Foundation, the National Aeronautics and Space Administration, and the Departments of the Army, Navy, and Transportation. The program also has a subcontract from EPA.

There are currently eight students in the S.M. program and eight in the Ph.D. or Sc.D. program. Each degree program has two women enrolled. The women are generally career change students, with prior backgrounds in the arts. No specific recruitment of students is done by the program, and students normally learn about the program from other students or faculty members. About three-fourths of the students receive financial assistance in the form of research assistantships and fellowships.

An average of four students graduate from the S.M. program each year and the Ph.D./Sc.D. program averages two graduates each year. These numbers are expected to remain stable. Approximately one-half of the S.M. graduates continue their education and of the remainder who seek employment, about thirty percent work for consulting firms, forty percent find employment in government agencies, and thirty percent work in research or teaching. Graduates generally find employment through personal contacts or through the M.I.T. placement office.

PROGRAM PROJECTIONS

No expansion of the program is foreseen in the near future, but officials indicated that one assistant professor may be added in the future.

ADDITIONAL INFORMATION

Program officials conduct summer short courses in acoustics and workshops in acoustical modeling for personnel of both industry and government.

COURSE DESCRIPTION

(the following is a partial listing of courses)

ME 2.060J Principles of Acoustics - Emphasizes acoustics of fluids: derivation of basic equations, radiation of sound, diffraction and scattering and acoustics of ducts and rooms. (3 s.h.)

ME 2.965J Flow Noise - Elements of aerodynamic and hydrodynamic sound. Subsonic and supersonic jet noise. Other relevant topics. (3 s.h.)

ME 2.066 Studies in Engineering Acoustics - Offers student an opportunity to study specialized areas of acoustics in depth. Specific topics vary. (no specified semester hours)

Aeronautics and Astronautics 16.082J Flow Noise - Elements of aerodynamic and hydrodynamic sound. Subsonic and supersonic jet noise. Jet noise suppression. (3 s.h.)

Pol Sci 17.851 The Domestic and International Politics of Energy - The first part deals with the politics of energy policy and energy choices in the U.S. Political issues associated with energy supply and demand in Western Europe, the Soviet Union, and East Asia; the international response to changes in the world oil market; the changing role of the multinational energy industry and the impact of energy trade on the world economic structure all are addressed. (3 s.h.)

INSTITUTION: MEMPHIS STATE UNIVERSITY

PROGRAM: Audiology

DEPARTMENT: Audiology and Speech Pathology

DEGREE: Master of Arts (M.A.)
Doctor of Philosophy (Ph.D.)

CONTACT: Dr. Daniel Orchik, Associate Professor of Audiology
Department of Audiology and Speech Pathology
Memphis State University
Speech and Hearing Center
807 Jefferson Avenue
Memphis, Tennessee 38152
(901) 525-2682

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

Graduate students in audiology and speech pathology at Memphis State University may choose either the audiology or the speech pathology concentration. Master's level or doctoral graduates in audiology typically enter the field of diagnostic audiology, rehabilitative audiology, or a combination of the two. Examples of typical work settings include offices of ear, nose and throat specialists or otolaryngologists, speech and hearing centers, secondary schools, universities, and other agencies and clinics. Duties often include identifying the types and degrees of hearing losses, locating sites of lesions, supervising ongoing hearing screening programs, carrying out speech and language therapy, and monitoring the efficiency of hearing aids.

Although the department offers no specialization in industrial or community audiology, through special selection of courses students may become especially qualified to conduct hearing conservation programs in industrial settings. Attempting to meet federal occupational noise regulations, those entering this field would do such things as conduct periodic noise surveys, train personnel to conduct hearing tests, review audiograms, provide advice concerning ear protectors and other noise control equipment, and serve as expert witnesses in court. Audiologists could also perform the same functions for industries on a contractual basis as private consultants. Although usually unable to make recommendations regarding engineering controls, some audiologists are qualified to carry out environmental noise control functions, most often with regard to industrial noise.

The department has been very active in carrying out research in audiology, with grants from such sources as federal agencies and foundations. While a portion of these research activities have related to the effects of noise on hearing, faculty members are interested in expanding these efforts and pursuing additional funds for research in environmental noise control and industrial hearing conservation. The department's educational and clinical programs are fully accredited by the American Speech and Hearing Association.

PROGRAM REQUIREMENTS

For automatic admission into the M.A. program, prospective students must have a grade point average of at least 3.0 on a four point scale, a GRE score of 900, and an MAT score of 40; students with scores below these minimums are subject to a screening procedure. Most students entering the program had undergraduate majors in speech and hearing, although such a program is not available at Memphis State University. Those with other undergraduate majors, if accepted into the master's program, normally take prerequisite courses. All applicants to the Ph.D. program are reviewed by the departmental admissions committee, and must have a grade point average of at least 3.5, a GRE score of 1000, and two letters of recommendation.

The program requirements for the M.A. with the thesis option include completion of thirty-six semester hours of graduate work, with twenty-four to thirty in the major area; and completion of academic and practicum requirements for the Certificate of Clinical Competence of the American Speech and Hearing Association. Completion of at least three hours of clinical experience is required, as well as a thesis. With the non-thesis option, students have the same requirements, but take a special projects course in lieu of the thesis, and must pass final comprehensive examinations.

Requirements for the doctoral degree include sixty hours beyond the master's degree. Thirty-three of these hours are taken within the department, with twenty-four in a collateral area. A dissertation and a comprehensive examination are required. Academic plans are formulated in conjunction with the candidate's advisory committee.

Student financial assistance is available through several avenues. Stipends are available through work that the Speech and Hearing Center performs under various contracts, and research contracts have assisted in providing student support. Several scholarships are available, as well as a limited number of positions under a training grant. All doctoral and most master's candidates receive some form of financial support.

CURRENT FACULTY, STUDENTS, GRADUATES

Three faculty members with Ph.D. degrees in the department work full-time in the audiology program, through teaching and research. Two master's level members serve as clinical supervisors for students in practicum. As audiology is not completely distinct from speech pathology, and all students take courses in both fields, faculty of the speech pathology program do in fact contribute to the audiology program. This includes six Ph.D. level persons, and four with master's degrees.

Currently there are fourteen master's and three Ph.D. candidates in audiology. An average of twelve persons receives master's degrees annually; no Ph.D.'s have been awarded to date since this program is only recently developed. Faculty members have observed that every active job seeker has found employment in the field, especially if mobile. The number entering the private and public sectors is nearly equal, but slightly in favor of the latter. A small percentage of those earnings master's degrees continue schooling in a Ph.D. program.

Very few of the program's students specialize in noise control and/or industrial and community audiology, or seek employment in these fields. A chief reason is that the demands in the job market are not great for persons in these fields. Those who are involved in these fields work in a consultative capacity on a part-time basis. The department's doctoral program is the more conducive towards obtaining the required expertise for environmental and industrial audiology and noise control.

PROGRAM PROJECTIONS

The audiology program will undergo a curriculum change in the near future, the exact nature of which is as yet to be decided. Officials believe that changes that are made will not significantly affect the program's applicability to environmental or industrial noise control. The number of faculty members is expected to remain stable, with the possible exception of adding a clinical supervisor. While the number of doctoral candidates is expected to grow and stabilize at approximately five, the number of those seeking master's degrees is expected to average fifteen in the future.

Long-range goals of the audiology program include increasing the emphasis on scholarly research and publication, further developing the capabilities with regard to education of handicapped children to meet recent federal legislation, and expanding efforts in sound amplification. Program officials believe there is a need for increased emphasis in industries and communities on noise control and hearing conservation. The lack of legislation, however, inhibits action in these areas. Under present circumstances, directing educational programs towards these fields would not prove practical with regard to job market demands.

COURSE DESCRIPTION

(Selected acoustics courses with relevance to environmental/industrial noise and hearing conservation)

AUSP 7001-8001 Hearing Science - Study of the measurements utilized in psychophysics and the physical structures of the hearing mechanism. (3 s.h.)

AUSP 7004-8004 Anatomy and Physiology of the Hearing Mechanism - Study of the structure and function of body organs related to the processes of speech production. (3 s.h.)

AUSP 7013-8013 Psychoacoustics - Presentation and discussion of modern theoretical and applied research concerning the psychological responses to acoustic stimuli. (3 s.h.)

AUSP 8014 Physiological Acoustics - Theoretical and applied research concerning the physiological responses, principally of the auditory system, to acoustic stimuli. (3 s.h.)

AUSP 8015 Instrumentation - Measurement and calibration of instrumentation typically used in speech and hearing science. (3 s.h.)

AUSP 7100 Introduction to Audiology - Topics include: physics of sound, hearing loss, basic audiometric testing and hearing conservation. (3 s.h.)

AUSP 7101-8101 Audiological Concepts - Investigation of basic audiological concepts and their applicability to clinical procedures. Topics include: masking, bone conduction, speech receptions, and speech discrimination. (3 s.h.)

AUSP 7102-8102 Hearing Disorders - Investigation of the audiological effects of diseases and injuries of the hearing mechanism. (3 s.h.)

AUSP 7103-8103 Differential Audiology - Consideration of special auditory tests involved in the differential diagnoses of peripheral hearing problems. (3 s.h.)

AUSP 7104-8104 Clinical Experience in Audiology - Supervised clinical experience in the evaluation and/or management of clients. (1 s.h.)

AUSP 7105-8105 Advanced Differential Audiology - Consideration of special auditory tests and electro-physiological techniques in the differential diagnosis of non-organic, peripheral and central hearing disorders. (3 s.h.)

AUSP 7109 Medical Aspects of Audiology - A comprehensive introduction to acute and chronic hearing disorders traceable to disease and their medical treatment. (3 s.h.)

AUSP 7113-8113 Industrial, Community and Military Audiology - Study of the requirements of audiology in the management, control, evaluation, and conservation of hearing problems in industry and the military. (3 s.h.)

INSTITUTION: NORTH CAROLINA STATE UNIVERSITY

PROGRAM: Specialization Acoustics, Noise and Vibration

DEPARTMENT: Mechanical and Aerospace Engineering

DEGREE: Master of Science
Master of Mechanical Engineering
Doctor of Philosophy

CONTACT: Dr. Franklin D. Hart
Center for Acoustical Studies
Department of Mechanical and Aerospace Engineering
North Carolina State University
Raleigh, North Carolina 27607
(919) 737-2373

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

Graduate training in noise and vibration at the university began in 1965, although the Center for Acoustical Studies (CAS) did not open until 1969. The Center has three general functions: education, extension, and research. Education takes the form of a specialization offered in noise and vibration at the master's and doctoral levels, for training noise and vibration control engineers to carry out research, perform regulatory duties in public agencies, participate in private consulting, or work within corporate structures. The multi-disciplinary program emphasizes noise control, random and transient vibrations, underwater acoustics, radiation acoustics, psychophysiological response, and bio-medical research.

The Center also offers training for public and private agencies in the form of short courses and seminars. Courses to industries cover such topics as audiometric testing, noise and vibration control for plant engineers, and hearing conservation. The CAS has also provided training to state OSHA inspectors, and serves in an advisory capacity to federal, state and local agencies in matters relating to noise and vibration.

The activities of the CAS are supported entirely through research grants and contracts from state and federal agencies, foundations, and industry. The primary areas of current project activity relate to: machinery noise, surface vehicle noise, aircraft noise and the health effects of noise.

Facilities for noise and vibration are valued at nearly one million dollars. These include large and small anechoic chamber facilities; a reverberation chamber facility; subjective noise response, neuropsychology, tire noise, machinery noise research, and instructional laboratories; audiometric testing rooms; and a large scale vibration testing laboratory.

PROGRAM REQUIREMENTS

The nominal prerequisite for entering the graduate study program is a B.S. degree in engineering, physics or mathematics. Students with degrees in the latter two areas normally are required to take several undergraduate courses in engineering.

Twenty-four hours of coursework and an acceptable thesis are the nominal requirements for the M.S. degree. Written and oral examinations as well as thirty hours of coursework are the requirements for the M.M.E. degree. Students may select complete or split minors from areas such as mathematics, physics, engineering, psychology and textiles. Three courses are required for the major: "Acoustic Radiation I", "Machine Vibration and Control", and "Industrial Noise Control". Each doctoral candidate's curriculum is subject to the discretion of that student's advisory committee.

Students in the department are required to satisfy the requirements for a major and a minor area. Those minoring in mechanical engineering (noise and vibration specialization) must complete nine credit hours in noise and vibration.

The majority of the students in this program receive financial assistance through research and teaching assistantships, scholarships, and remission of out-of-state tuition. The research programs also support several full-time research positions of limited appointment and post-doctoral positions.

CURRENT FACULTY, STUDENTS, GRADUATES

Seven faculty members and one affiliate contribute full-time teaching and research support to this program. An additional six faculty members from various departments work part-time with teaching and/or research in noise and vibration. Faculty from the University of North Carolina at Chapel Hill and Duke University work with the CAS faculty on educational and research programs in the field.

Thirty students are currently participating in the acoustics program, twenty-three of whom have a major concentration in noise and vibration. Twenty of these are pursuing master's degrees, while ten are working on their Ph.D.'s.

The CAS awards two to three Ph.D. degrees and five to six M.S. degrees per year. Since the program's inception, the demand for the graduates has exceeded the supply. An estimated 90 percent accept employment with private industry. A small number of those earning master's degrees return to school to pursue Ph.D.'s.

PROGRAM PROJECTIONS

The chief goal of the CAS is to continue carrying out the three main functions of the Center. With regard to post-graduate education, there are more faculty and research facilities to accommodate students than there are grants and contracts to support them. CAS administration will continue to seek additional support for the training of noise control engineers.

A slight increase in annual graduates is expected in the near future, with a continued growth expected if additional support is received. While additional full-time faculty will not be required, increased interest and support is expected from other departments in the university.

COURSE DESCRIPTION

MAE 510 Effects of Noise and Vibration on Man - Study of the effects of noise and vibration on humans. Includes acoustic and vibration fundamentals, auditory and non-auditory response to noise, subjective response to noise, environmental noise, body physical characteristics, effects of vibration and shock exposure. (3 s.h.)

MAE 513 Machine Vibration and Control - Modeling of mechanical systems for vibration analysis and presentation of exact and approximate solution techniques. Techniques of vibration control and experience with computing techniques. (3 s.h.)

MAE 514 Industrial Noise Control - A study of terminology and instrumentation used in noise control, review of effects of noise on man, sound propagation in the industrial environment, measurement and analysis of noise, federal and state standards and criteria, control methodologies at the source, in the path and at the receiver, and vibration isolation as related to noise control. (3 s.h.)

MAE 517 Instrumentation in Sound and Vibration - Presentation of measurement techniques and the theory and operation of transducers and amplifiers. An introduction to signal analysis techniques such as power spectral density and correlation. (3 s.h.)

MAE 518 Acoustic Radiation I - An introduction to the principles of acoustic radiation from vibrating bodies and their related fields. Radiation of simple sources, propagation of sound waves in confined spaces and transmission through different media. (3 s.h.)

MAE 519 Theory of Noise in Transportation Systems - A study of the basic noise generating mechanisms encountered in transportation systems. Includes jet noise, propeller noise, helicopter noise, fan and compressor noise, aircraft induced community noise, surface vehicle noise models and efforts to control noise in transportation systems. (3 s.h.)

MAE 614 Mechanical Transients and Machine Vibrations - Forces and motions produced in mechanical systems by periodic transient inputs including shock and impact loading. Application to lumped mass and continuous systems. (3 s.h.)

MAE 618 Acoustic Radiation II - Advanced treatment of the theory of sound generation and transmission. Includes techniques for solution of the wave equation; radiation from spheres, cylinders

MAE 618 (Cont'd) - and plates; sound propagation in ducts; scattering. (3 s.h.)

MAE 619 Random Vibrations - Mathematical description of stochastic processes. The stationary and ergodic assumptions and response analysis of mechanical systems to random excitation. Application of random process theory to signal processing. (3 s.h.)

MAE 623 Mechanics of Machinery - Advanced applications of dynamics to the design and response analysis of dynamic behavior of machines and mechanical devices. Emphasis on developing competence in transforming real problems in dynamics into appropriate mathematical models whose analysis permits performance predictions of engineering value. (3 s.h.)

INSTITUTION: THE PENNSYLVANIA STATE UNIVERSITY

PROGRAM: Acoustics

DEPARTMENT: Interdisciplinary Committee of the Graduate School

DEGREE: Master of Engineering (M.E.)
Master of Science (M.S.)
Doctor of Philosophy in Acoustics (Ph.D.)

CONTACT: Richard O. Rowlands
Professor of Engineering Research
Graduate Program in Acoustics
Applied Research Laboratory
The Pennsylvania State University
University Park, Pennsylvania 16802
(814) 865-6364

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

The Graduate Program in Acoustics began in 1966 when an underwater acoustics program was developed for graduate students working in U.S. Navy laboratories. Penn State was interested in developing an acoustics program so a package of courses was offered if the U.S. Navy would send 30 or more students for three consecutive summers. The participants were given graduate course credits and gradually other courses were added to form the Graduate Program in Acoustics. In recent years, the point of gravity of the program has shifted from underwater sound to airborne sound, particularly to applications in physical acoustics, architectural acoustics, and noise control.

This intercollege-interdisciplinary program enables students interested in acoustics to obtain an integrated program of courses covering the fundamentals of science and the biological, communications, and engineering applications of acoustics. Students are provided with a broad educational background in acoustics and related sciences plus an opportunity to concentrate on acoustical problems in a selected area of interest.

Programs are arranged through a selection of appropriate courses offered by several departments in the Colleges of Science, Engineering, and Education, as well as those specifically in the area of acoustics. Areas of concentration include acoustic signal processing, architectural and building acoustics, noise and vibration, physical acoustics, speech and hearing, and underwater acoustics.

The Graduate Program in Acoustics is administered by a committee whose members are selected from a variety of acoustics subfields to provide a balance for the field as a whole. Facilities are located in several specialized laboratories: in the Applied Research Laboratory; Environmental Acoustics Laboratory; Noise Control Laboratory; Architectural Acoustics Laboratory; Speech Laboratory; Engineering Mechanical Vibration Laboratory.

Many graduates of the Graduate Program in Acoustics find positions with the U.S. Navy, defense contractors, industry, and consulting firms (mostly in architectural acoustics and noise control). Others find research and teaching positions in academia. Graduates of the program have little difficulty obtaining employment.

PROGRAM REQUIREMENTS

Prospective applicants must meet the admission standards of the Graduate School as well as of the Program and hold a bachelor's degree in biology, engineering, mathematics, physics, speech and hearing, or a closely related field. Minimum undergraduate requirements normally include mathematics through integral calculus, and one year of physics.

The Master of Engineering degree in Acoustics requires completion of a minimum of 30 graduate course credits, a scholarly written report, a minimum GPA of 3.0 and 20 credits to be earned in residence. No foreign language is required.

The Master of Science degree also requires completion of a minimum of 30 credits of graduate work with a minimum GPA of 3.0, completion of a thesis for 6 credits of thesis research, and a thesis defense. Twenty credits are to be earned in residence. No foreign language is required. The program's faculty prefer all master's candidates to enroll for the M.S. degree; but if for some reason they cannot complete the requirements, they may qualify for the M.E.

The Doctor of Philosophy degree in Acoustics requires approximately 60 credits beyond the baccalaureate with a minimum GPA of 3.0. These terms are to be completed in residence. Also required are a qualifying candidacy examination, a comprehensive exam (GPA at least 3.0), a final oral examination, and computer programming. Proficiency in the English language and a reading knowledge of Russian, German, or French is required to earn the doctorate. A thesis is required but may be written in absentia.

Financial support is available to students through participation in the University's research program. Various kinds of fellowships, or traineeships, grants-in-aid, and graduate assistantships are also available. A total of 37 graduate assistantships are available from other sources. Six employees of the Applied Research Laboratory are also enrolled in the program.

CURRENT FACULTY, STUDENTS, GRADUATES

The combined total of full-time faculty in all three professorial ranks is nine. There are three faculty members who devote fifty percent of their time to teaching and the other fifty percent to laboratory research activities. Sixteen other faculty members devote ninety percent of their time to laboratory work and teach one course annually. The combined total of full-time, part-time, and other faculty is 28.

The U.S. Navy and the U.S. Occupational Safety and Health Administration provide the bulk of the Program's research funding. The Applied Research Laboratory is an interdisciplinary research unit sponsored almost exclusively by the U.S. Navy. The Laboratory currently has forty-seven applied and basic research projects in progress. The College of Engineering's Noise Control Laboratory conducts theoretical and experimental research on the use of forests for noise control and the propagation of highway noise over finite impedance ground planes. There has been continuous financial support of the Architectural Acoustics Lab by the National Science Foundation. This laboratory conducts research on radiation and measurement of noise by various sources. A variety of other research topics are conducted by various other laboratories.

There are currently 47 students enrolled in all acoustics degree programs. At present (Spring 1978), there are 41 full-time (two female) and six part-time (one female) students enrolled. Twenty-four are enrolled in the M.S. program and 23 are enrolled in the Ph.D. program. Enrollment has been steadily increasing over the past few years (e.g., 37 were enrolled in Fall 1976). An annual average of eight students (four M.S., four Ph.D.) receive degrees from the Graduate Program in Acoustics.

Few students continue on for further degrees although some M.S. students continue on for their Ph.D. at Penn State. Graduates have little difficulty finding employment and virtually all have employment directly in their field. Recent trends indicate that 25% find private sector jobs and the remaining 75% find government positions. A recent follow-up study was conducted by the Program and in an updated November, 1976 survey of 57 graduates: 16 (28%) were working for Research Laboratories; 17% were employed by the Federal government (mostly U.S. Navy); 5 (9%) had positions at universities; 11 (19%) were employed by the private sector (defense contractors and consulting firms); and 1(2%) was self-employed. No responses were received from 7 (12%) graduates.

PROGRAM PROJECTIONS

Program officials project an increased emphasis in commercial and environmental acoustics and less emphasis in defense in future years. The Graduate Program in Acoustics is expected to gradually increase in both faculty staff size and enrollment. Rather than increase the Program's own staff, the tendency is to bring in faculty from other departments to teach related courses. The Program has become increasingly interested in ultrasonics and a new staff member of the Applied Research Laboratory that was recently hired will teach a course in ultrasonics and conduct research.

COURSE DESCRIPTION

(the following is a partial listing of courses)

ACS 401 General Acoustics - Basic principles of acoustics; perception of sound; electroacoustic transducers and fundamentals of sound technique. (3 s.h.)

ACS 402 Fundamentals of Acoustics - Basic principles of acoustics and perception of sound; fundamentals of applications. (3 s.h.)

ACS 511 Underwater Sound Propagation - Underwater sound propagation is described theoretically using both the ray acoustic and normal mode solutions to the wave equation in fluid media. Application is made to both shallow and deep ocean water. (3 s.h.)

ACS 512 Electroacoustics Transducers - Basic principles and construction of transducers for measurement and generation of sound. (3 s.h.)

ACS 513 Digital Signal Processing - Modern methods of digital signal processing, filter theory and application, and measurement of acoustical signals. (3 s.h.)

ACS 515 Acoustics in Fluid Media - Wave propagation in stationary and moving fluids; acoustic radiation and scattering; standing waves in ducts and cavities. (3 s.h.)

Phys 443 Intermediate Acoustics - Simple harmonic motion. Fourier analysis of complex oscillations. Three-dimensional wave propagation. Ray path curvature due to velocity gradients. Electromechanical transducers and array directivity. (3 s.h.)

Phys 533 Theoretical Acoustics - Vibrating systems; transmission of disturbances through elastic and viscoelastic media. (3 s.h.)

E E. 562 Detection Theory - Detection decision theory, Bayes and Neyman-Pearson criteria, optimal receivers, classical estimation theory signal-noise representations, optimum linear signal parameters estimation. (3 s.h.)

ACS 597 Ultrasonics - The equations of motion in crystals; Piezo-electric equations; the vibration of a quartz crystal, effect of cylindrical boundaries, complex modes, coupling between shear and dilatational modes; Piezo-electric microphones and Piezo-electric materials (quartz, turmaline, barium titanate); sound attenuation in liquids and solids; reflection at solid interfaces; material testing; medical and industrial applications of ultra-sound. (3 s.h.)

A E 400 Acoustics of Outdoor Spaces and Noise Pollution - Propagation of sound outdoors. Traffic noise. Aircraft noise. Criteria for noise in communities. (3 s.h.)

A E 458 Building Acoustics - Advanced considerations of noise control in buildings, ventilating system noise and vibration control, acoustical design variables. (3 s.h.)

A E 542A Advanced Architectural Acoustics and Noise Control - General properties of sound propagation and sound fields in enclosures. Sound sources and sound perception in enclosures. Sound absorption and absorbers. Sound isolation and design criteria. (3 s.h.)

A E 542B Advanced Building Acoustics - Transmission loss of single and composite walls, propagation and radiation of sound from structures. Machine enclosures. Criteria for noise in buildings. Noise of air-conditioning systems.

Aerosp 444 Noise Pollution of Fluid Dynamic Origin - General aspects of hearing, sound propagation and absorption, noise generated by turbulent flows and rotating devices, piping noise, structural response. (3 s.h.)

Aerosp 511 Aerodynamically Induced Noise - Review of fluid mechanics. General theory of aerodynamic sound. Noise radiation from jets, boundary layers, rotors and fans. Structural response. (3 s.h.)

M E 458 Noise Control in Machinery - Noise sources, noise criteria, propagation of noise. Noise reduction in machines. Measurement and analysis of noise. (3 s.h.)

S P A 430 Introduction to Audiology - Physics, physiology, and psychology of hearing; measurement and evaluation of hearing loss; educational, social, and vocational problems of hearing handicapped. (3 s.h.)

S P A 532 Acoustic Instruments for Hearing - Acoustical instrumentation used for research in hearing, programs of hearing conservation, and noise control, including clinical and industrial applications. (3 s.h.)

S P A 534 Noise and Hearing - Noise-induced hearing loss, masking of speech communication, and annoyance caused by exposures to sonic, infrasonic, and ultrasonic acoustic energy. (3 s.h.)

E Mch 412 Experimental Methods in Vibrations - Systems of one or more degrees of freedom, mechanical vibrations, vibration properties of materials, vibration techniques in non-destructive testing. (3 s.h.)

E Mch 528 Experimental Methods in Vibrations - Nondestructive dynamic testing. Pick-ups and transducers, filter, operational amplifiers, integrators, attenuators, read-out devices. Measurement of: travelling and standing waves, impedance, transfer function, Bode plots, shock spectra, Fourier spectra, power spectra. (3 s.h.)

E Mch 570 Random Vibrations in Structural Mechanics - Probability theory applied to random vibrations of linear and nonlinear systems; excitation by ground motion, turbulence, and noise; acoustic damping. (3 s.h.)

E Mch 597 Measurement of Motion of Solids and Fluids - Electrical measuring equipment, vibration pick-ups, strain gauges, hot wires, correlators, laser velocimeters, measurement of pressure velocity, flow, vibrations, turbulence, spectra. Optical measurements of mechanical quantities. (3 s.h.)

INSTITUTION: UNIVERSITY OF PITTSBURGH

PROGRAM: Environmental Health Engineering/Industrial Hygiene

DEPARTMENT: Industrial Environmental Health Sciences

DEGREE: Master of Science in Hygiene
Master of Public Health in Environmental Health
D.S. in Hygiene
Ph.D. in Toxicology

CONTACT: Dr. Gerald St. Denis
Assistant Dean for Student and Alumni Affairs
Graduate School of Public Health
University of Pittsburgh
Pittsburgh, Pennsylvania 15260
(412) 624-3002

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

The Graduate School of Public Health's Department of Industrial Environmental Health Sciences offers specialized programs in four major areas and their subspecialities: industrial hygiene, toxicology, environmental health, and occupational medicine. The department's objective is to aid in the detection and management of health hazards generated by industrial activities which affect workers and the general population in their environment. Graduates are qualified to strive to improve the protection of health from the stresses of exposure to modern industrial agents, to aid in the assessment of the health cost, and to develop methods of reducing it. They carry out these functions in industry, government, and in academia.

The department has a variety of specialty programs which include: Acoustical Environmental Control; Air Resources Management; Industrial Hygiene and Air Engineering; Toxicology; and Environmental Health (Health Aspects of Water Quality, Environmental Health Planning).

The Graduate School of Public Health has a variety of modern research laboratories which include an anechoic chamber and a whole body counter, among others. Further research opportunities exist in the Pittsburgh area in county and state health departments, local industries, and local health and welfare departments.

PROGRAM REQUIREMENTS

In order to be admitted to the Graduate School of Public Health, a quality point average of 2.5 out of a possible 4.0 in undergraduate work is required. Grades which are earned in the major field of the applicant are assigned a greater weight in the evaluation for admission. To be admitted for the Master of Public Health degree, candidates must possess: a graduate degree from an acceptable institution, in a discipline relevant to public health or a bachelor's degree with substantial knowledge in a discipline relevant to public health; a minimum of six college credits in biology; a minimum of six college credits in behavioral sciences; and a minimum of three college credits in mathematics or in statistics. Students not having a previously earned post-baccalaureate degree must submit scores on the verbal and quantitative aptitude portions of the Graduate Record Examination. Additional requirements may be specified by the major department, division or program.

The Master of Science in Hygiene and the Doctor of Science in Hygiene in acoustic environmental control are currently being offered by the Department. These degree programs are being dropped, although some courses in the field of acoustics will continue to be offered. The current program requires three full terms of study and the completion of a satisfactory master's essay. The Doctor of Science in Hygiene in acoustic environmental control is a three year program offering an in-depth study of engineering control technology, as well as of physiological and psychological response to acoustic stimuli. Students will be trained to solve problems in virtually all situations involving human beings and the acoustic environment. Required are passing of preliminary and comprehensive examinations as well as presentation of a satisfactory doctoral dissertation.

The Air Resources Management Curriculum affords the engineer or scientist an opportunity to study management of air resources, including the physical properties of air pollutants, their sources and detection techniques. Students are offered the Master of Science in Hygiene degree in air resources. Six to eight credits of electives are required, as is completion of a satisfactory master's essay. A minimum of three full terms of study (September-August) is required.

In Industrial Hygiene and Air Engineering the Master of Science in Hygiene in industrial hygiene is offered. It is a one year program of study leading to a master's degree for physical or biological scientists or engineers. Master's students are also required to take six to eight credits of electives and write a satisfactory master's essay. A minimum of three full terms of study (September-August) are required. This program may be extended into a doctoral program with emphasis in a selected area of industrial hygiene or air engineering, e.g. industrial hygiene engineering, analytical methods, aerosol physics. Selected courses in the School of Engineering, departments in the natural sciences or the School of Medicine may be taken for credit by doctoral students who enroll in one of these areas.

In Toxicology, the Doctor of Science in Hygiene or the Ph.D. degree in Toxicology is offered to a limited number of candidates possessing a degree in the basic sciences. No specific requirements are enumerated for this multidisciplinary field but the program of study is selected from courses in the department and is supplemented with courses from the Departments of Biochemistry, Pharmacology, and Physiology.

In Environmental Health, degree programs leading to the Master of Public Health, Master of Science in Hygiene, and Doctor of Science in Hygiene are offered. The program is designed to educate the environmental health professional and to train specialists in health aspects of water quality. The Master of Public Health in Environmental Health curriculum is intended to offer the engineer, chemistry, biologist, or others the opportunity to concentrate on the planning and administration of environmental health programs. Other requirements include a topical essay; four terms of study; and detailed evaluation of a problem with original conclusions and recommendations. The Master of Science in Hygiene in Health Aspects of Water Quality degree program is intended to allow specialization in the field of water supply and pollution control with emphasis upon theoretical or applied research, administration of water supply and pollution abatement programs and planning. A minimum of four terms of study and completion of a satisfactory master's essay dealing with a topic of current interest in the field are required. The Doctor of Science in Hygiene degree program is tailored to suit individual candidate needs, and selected courses from other University departments related tothe candidate's background and interests may be taken.

The Environmental Health Planning cooperative study program leads to the Doctor of Science in Hygiene degree. This doctoral program is a joint undertaking with the Urban Affairs and Planning Department of the Graduate School of Public and International Affairs. The program is composed of core studies inthe fields of planning and environmental health, and an option in either of these areas can be selected for emphasis. Joint seminar courses and additional courses in the option must be taken by the program's students.

The Department of Industrial Environmental Health Services will offer an internship program for students with no previous work experience. Placement will probably be with local county and state health departments.

The Graduate School of Public Health annually receives a limited amount of funding for general purpose traineeships. The Department of Industrial Environmental Health has traineeships in industrial hygiene which provide $1,000 each toward each student's tuition costs. Pennsylvania students are eligible to apply for educational loans administered by the Pennsylvania Higher Education Assistance Agency. Loans of up to $1,000 per year in federal funds are available to qualified students enrolled in schools of public health under the Federal program of insured loans to graduate students in health professional schools.

CURRENT FACULTY, STUDENTS, GRADUATES

A total of 41 faculty members teach the curriculum offered by the Department of Industrial Environmental Health Sciences. Included are five full professors, one research professor, four associate professors, two research associate professors, and four research assistant professors. The department is further assisted by a research associate, thirteen adjunct professors, four clinical associate and assistant professors, and six lecturers. The five full professors have backgrounds in toxicology, water chemistry, industrial hygiene and air engineering, occupational health, and environmental health engineering. The two research associate professors have backgrounds in occupational health and water pollution control.

The department has a total enrollment of fifty-nine students; twenty-four are part-time. It is estimated that ten to fourteen new students enter each year. There are four graduating periods during the year, and students receive their degrees after their essays are completed. A total of thirty-one students received degrees during 1977 and many (48 percent) received degrees in indusgrail hygiene. Thirty-eight percent received degrees in environmental health, 10 percent in acoustical environmental control, and 3 percent in toxicology. The 1977 breakdown is as follows:

M.S. in Hygiene in Industrial Hygiene:	15
M.S. in Hygiene in Environmental Health:	6
Ph.D. in Hygiene in Environmental Health:	6
M.S. in Hygiene in Acoustical Environmental Control:	3
Ph.D. in Toxicology:	1
Total:	31

Most M.P.H. and M.S. in Hygiene degree graduates obtain positions with county or state health departments in administrative or research positions. Most doctoral graduates find academic positions and a few graduates have found positions with federal agencies.

PROGRAM PROJECTIONS

Because of budgetary considerations and lack of laboratory space, the Graduate School of Public Heatlh is expected to remain at present enrollment and staffing levels. No more than fifteen full-time students will be admitted in subsequent years into the department's programs. The principal changes will be the reduction of the degree and an internship program will also be developed for students enrolled in the industrial health program.

COURSE DESCRIPTION (SELECTED)

IEHS 201 Introduction to Occupational Health - The physical and chemical properties and the methods of measurement of industrial enviornmental hazards are discussed. Basic concepts of thermodynamics and chemical kinetics and properties and measurement of suspended particles, gases, toxic materials, heat, noise, ionizing and non-ionizing radiation. (4 s.h.)

IEHS 205 Introduction to Sound Stimuli and Auditory Functioning - Synthesizes the physical parameters of sound with anatomy and physiology of hearing. The course will be diercted toward the auditory and non-auditory effects of noise on humankind. (3 s.h.)

Introduction to Acoustics - This lecture course includes physics of sound, measurement and analysis of noise and vibration, industrial hearing conservation, and noise control practice. (2 s.h.)

IEHS 209 Noise Reduction - The basic physical principles are systematically developed. Topics include design of resistive and reactive mufflers, transmission through structures, vibration isolation, system performance and case studies. (4 s.h.)

IEHS 212 Dynamical Analogies - Equivalent circuits of mechanical anc acoustical systems are employed to determine system response. Techniques of Laplace transform and pole-zero diagrams are used to study system response. (4 s.h.)

IEHS 221 Special Studies in Industrial Environmental Health Sciences - Properly qualified students may undertake research for the master's essay requirement with the approval and under the guidance of a member of the staff. (s.h. to be arranged)

IEHS 231 Introduction-Health Apsects of Water Quality - This course deals with the history (microbiological, chemical and physical), nature, and control of waterborne disease. (2 s.h.)

IEHS 235 Sanitation of Natural Wastes - Studies physical, chemical and biological characteristics of natural waters; sources, types, and effects of pollution; natural purification processes; oxygen balance in polluted water; determination of waste assimilative capacity. (3 s.h.)

IEHS 237 Water Systems Measurement - Consists of lectures, laboratory, and field trips devoted to the chemical, physical, and biological analysis of natural and treated waters and stream flow. (3 s.h.)

IEHS 238 Current problems in Water Pollution Control and Abatement - Field trips to water pollution control and enforcement agencies. (1 s.h.)

IEHS 241 Topics in Environmental Control - Teaches the science and practics of food and milk sanitation, insect and rodent control, housing, accidental injury prevention, noise and its abatement, and community air pollution control. (4 s.h.)

IEHS 243 Solid Waste Management - Discusses the nature of solid wastes, their impact on the environment and potential for disease transmission, and the technology, management and planning utilized in their treatment and disposal. (2 s.h.)

IEHS 247 & 248 Joint Colloquium in Urban and Environmental Health Planning I & II - Issues in urban and environmental health planning; research interests of the faculty and the more advanced students. (1 s.h. each)

IEHS 249 Water and Waste Management - Class project in which an actual water pollution situation is investigated. (3 s.h.)

IEHS 261; 262; 263 Analysis of Airborne Contaminants I; II; III - Physical methods of the evaluation of working conditions; methods of evaluation of physical stresses in working environments; chemical methods of the evaluation of working conditions. (1 s.h.; 1 s.h.; 2 s.h.)

IEHS 266 Industrial Hygiene Practice - Familiarizes the student with industrial hygiene problems and applications in a variety of industries. (2 s.h.)

IEHS 268 Industrial Toxicology - Covers entry, action, and elimination of toxic materials, describes experimental methods of determining toxic limits, discusses the design of toxicology experiments,and the more important industrial chemicals. (3 s.h.)

IEHS 269 Principles of Air Resources - Introduces the student to the broad field of air pollution. The first half of the course deals with sources, economics, controls of air pollution and micrometeorology. The second half is devoted to atmospheric chemistry. (3 s.h.)

INSTITUTION: FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

PROGRAM: Environmental Noise Control Training

DEPARTMENT: Division of Environmental Programs

DEGREE: Non-academic certificate

CONTACT: Mr. Jesse O. Borthwick, Administrator
Noise Control Section
Division of Environmental Programs
Florida Department of Environmental Regulation
2600 Blairstone Road
Tallahassee, Florida 32301
(904) 487-2095

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

The Florida Motor Vehicle Noise Prevention and Control Act of 1974 regulates environmental noise stemming from motor vehicles, the state's largest single cause of noise pollution. The law contains three major components: new vehicle standards, operating noise limits, and replacement equipment certification. The Department of Environmental Regulation (DER), through its Noise Control Section, is responsible for overseeing the program as a whole and implementing the new vehicle and replacement equipment regulations; moving vehicle regulations are enforced by the Florida Highway Patrol as well as by city and county police officers. The DER noise program also provides assistance to localities in developing and implementing noise programs.

Under contract with the DER, professors from five universities (the University of West Florida, the University of South Florida, Florida Technological University, the University of Florida, and Florida Atlantic University) assist in providing technical assistance to localities, carry out noise-related research and surveys, and participate in the development and implementation of the various noise training programs offered by the DER. These programs include motor vehicle noise enforcement courses for Highway Patrol and local police officers, general environmental noise courses for local noise code enforcers, community noise workshops, and workshops on the fundamentals of highway noise for various local officials.

PROGRAM REQUIREMENTS

DER's major educational efforts go to the training of law enforcement officers in motor vehicle noise enforcement, as the law requires that each person carrying out this duty must be trained and certified; recertification is required every three years. Following the law's passage, the DER Noise Section and the university contractors carried out two-week training sessions for those officers who would assist in teaching subsequent courses. The first week largely was concerned with demonstrations, while during the second, a representative of California's noise control program (which Florida's was patterned after) spoke regarding that state's experiences. Each of the following motor vehicle noise enforcement training sessions lasted four and one-half days, and was taught by one university official and two of the previously trained law enforcement officers. Course content included the basic theory of sound, causes of vehicle noise, highway measurement, the use of sound level meters, laws and rules, enforcement, and court appearances. The final eight hours were spent with field exercises. Each participant took a test, and upon passage was awarded a certificate that was issued jointly by the DER and the Florida Highway Patrol. Recertification training for instructors has been carried out, lasting two and one-half days. Refresher training will also be offered for all other officers; these courses will last two days.

In the past three years, the DER has also sponsored approximately twenty training sessions on general environmental noise for persons charged with enforcing local ordinances, such as law enforcement officers, city planners and building inspectors. Also conducted by university professors, these sessions have lasted two to three days. Subject matter has included the human response to noise (hearing loss, speech interference, sleep interference, and annoyance); the fundamentals of sound (characteristics, frequency analysis, classes of sound, decibels, and noise rating schemes); and equipment and procedures for measurements (the sound level meter, ambient noise, and various procedures). Certificates of completion are awarded to those who attend entire sessions.

Among the other educational offerings coordinated by the DER Noise Section was a community noise workshop that was held once for governmental and industrial representatives. In this workshop, federal regulations and programs were discussed, the fundamentals of noise presented, and a model noise ordinance released. Noise officials have also coordinated two one-week workshops on the fundamentals of highway noise for state highway officials, and two of the same kind for the Florida Department of Transportation. This is a packaged course available through the Federal Highway Administration. Additionally, the DER and State Department of Transportation co-sponsored a two-day conference for the Division of Forestry of the Florida Department of Agriculture and Consumer Services on the use of vegetative barriers for reducing the noise from vehicles on highways. No tuition is charged for any DER noise course.

CURRENT FACULTY, STUDENTS, GRADUATES

All of the noise-related courses have been coordinated by one to two DER noise representatives, and taught principally by the university professors under contract to the DER. Approximately three hundred law enforcement officers have been certified for motor vehicle noise enforcement. An estimated two hundred persons have attended general environmental noise training programs, and approximately 125 have attended one of the four courses that have been taught on the fundamentals of highway noise. Finally, nearly one hundred persons attended the community noise workshop and approximately twenty-five foresters participated in the conference on vegetative barriers. In all, approximately 750 persons have had noise-related training under the sponsorship of DER.

PROGRAM PROJECTIONS

DER noise control officials have the goal that within several years five hundred law enforcement officers will be certified in motor vehicle noise enforcement, and that such enforcement activity will be taking place in every county of the state. This goal is considered realistic, as an increasing number of citizens are pressuring local police departments to control environmental noise. The training may in the future be expanded to include other environmental noise and ordinance enforcement, and lengthened to four and one-half days. The chief problem encountered with statewide enforcement of motor vehicle noise regulations is the lack of sound level meters, and the resistance of communities to spending the money required to obtain such equipment.

The training manual for the general environmental course will be reviewed, updated and published. It is anticipated that in the future, at least one hundred new persons per year will participate in such sessions. Tentative plans call for administering examinations and issuing certificates of competency.

Noise-related training courses will continue to be offered as needed to meet recertification demands, fulfill goals, and fill other training needs that may appear. Plans are under way at the present time to offer a workshop in 1978 on land use planning and noise control for state and local planners.

INSTITUTION: UNIVERSITY OF TENNESSEE CENTER FOR HEALTH SCIENCES

PROGRAM: Training Courses in Audiometric Orientation

DEPARTMENT: Otolaryngology and Maxillofacial Surgery

DEGREE: Certificate of Attendance and Continuing Education Units

CONTACT: Verna A. McHaney, M.C.D., C.C.C.-A
Assistant Professor
Department of Otolaryngology and Maxillofacial Surgery
University of Tennessee Center for Health Sciences
800 Madison Avenue
Memphis, Tennessee 38163
(901) 528-5885

PROGRAM DESCRIPTION:

PROGRAM STRUCTURE

Two audiometric orientation training courses are offered by the University of Tennessee Center for Health Sciences: The Audiometric Orientation Training Course for Industrial Hearing Conservationists and the Audiometric Orientation Refresher Course for Industrial Hearing Conservationists. The former course is designed to help industrial plant management personnel, safety engineers, and plant nurses in understanding hearing conservation and to initiate and conduct hearing conservation programs. The refresher course is designed to update the knowledge of those who have taken the first course. These courses have been offered since 1970.

Course content follows original Intersociety guidelines and meets the requirements of the Council for Accreditation in Occupational Hearing Conservation (CAOHC). Those who successfully complete the first course recieve a certificate of attendance and are awarded two and two-tenths continuing education units. These may also apply for certification with the CAOHC as occupational hearing conservationists. Recent guidelines recommend that individuals certified more than five years ago take the refresher course in order to remain certified.

PROGRAM REQUIREMENTS

Participants in the first course need not have had any previous experience or training in hearing conservation. This course lasts three days, and is held twice each year. Content and format remain quite similar from course to course. Typically, the first day of the course offers information regarding sound, noise and its effects on the ear, anatomy and physiology of the ear, audiometric testing and the testing environment, and practical instruction in audiometric testing. During the second day such topics are covered as noise measurement and analysis, hearing protectors and their use, medico-legal aspects of compensation, labor and environmental legislation (state and federal), calibration, record keeping and additional practicum. The final day is typically spent on such topics as diseases of the ear, interpretation of the audiogram, follow-up recommendations, and the responsibilities of the hearing conservationist.

Current CAOHC certification is granted for a five-year period. After the initial certification period, the hearing conservationist must take a refresher course and apply for recertification by the Council. Therefore, a Refresher Course will be offered annually or upon demand. This course lasts one day, and provides updates and reviews on many topics covered during the original course. These topics include: legislation and noise standards, calibration procedures, hearing protection, referral criteria, examination of the ear, records and record keeping, audiometric technique and configurations, effects of noise on hearing, and continuing education. A discussion is held at the close of the day.

CURRENT FACULTY, STUDENTS GRADUATES

On the average, six persons from the Department of Otolaryngology and Maxillofacial Surgery teach parts of each three-day course. Additionally, approximately eleven guest faculty teach portions of each of these courses. These guest faculty represent such diverse professions as nursing, industrial safety, law, safety engineering, and audiology; current places of employment include universities, consulting firms, law firms, industries, and the Tennessee Occupational Safety and Health Administration. An average of three persons participates in teaching the refresher course each time it is held; two are from the department and one is a guest.

Program sponsors try to limit attendance to each three-day course to twenty persons. However, the average number participating is twenty-five; approximately fifty receive initial certification each year. An average of fifteen takes the refresher course at each offering although no limit is placed on attendance at this course. Approximately sixty-five percent of the participants are from Tennessee.

Over one-half of the participants in the courses are registered nurses or licensed practical nurses who work with industrial plants, although some of the nurses are employed with private medical offices. Also attending courses are plant engineers, personnel managers, or others who will be responsible for the hearing conservation programs. There has been no need to recruit participants, as all courses have met or exceeded the quotas. Course fees are normally paid by the sponsoring bodies.

PROGRAM PROJECTIONS

If guidelines or legislation change regarding the format and/or content of courses of this nature, these courses will be modified accordingly. No other changes are currently anticipated. The number of persons participating in the annual refresher course may increase, due to the recent requirement for recertification. This is not expected to affect the number of faculty utilized.

ADDITIONAL INFORMATION

From their clinical experiences, program sponsors have noticed hearing losses in children and teenagers. This is attributed largely to the common practice of listening to very loud music. These hearing losses support the officials' feelings that the fields of noise control and hearing conservation will grow as the needs continue to be recognized.

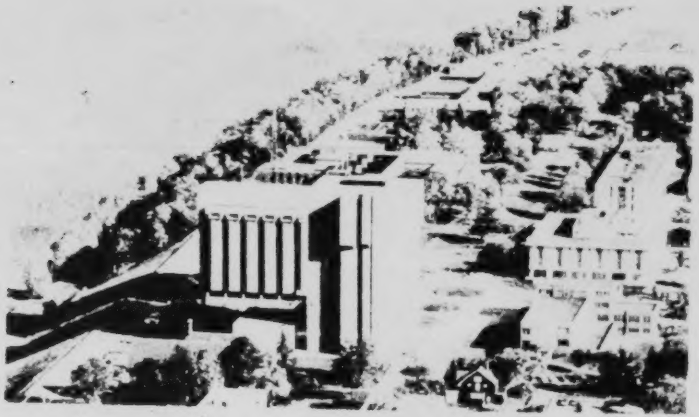


Photo reprinted from the Michigan Technological University Catalog 1975-76

APPENDICES

Photo reprinted from the University of Illinois Institute of Technology Booklet

Photo reprinted from the Indiana University of Public and Environmental Affairs Catalog 1977-78

APPENDIX I

DEGREE ABBREVIATIONS

APPENDIX I

Degree Abbreviations

A.A.	Associate of Arts
A.A.Ag.	Associate of (in) Applied Agriculture
A.Ag.	Associate of (in) Agriculture
A.A.P.C.T.	Associate Degree in Air Pollution Control Technology
A.A.S.	Associate of Applied Science
A.B.	Bachelor of Arts
A.D.	Associate Degree
A.E.T.	Associate in Engineering Technology
A.M.T.	Associate of Mining Technology
A.N.E.T.	Associate of Nuclear Engineering Technology
A.S.	Associate in Science
A.S.E.M.T.	Associate of Science in Engineering Mining Technology
A.T.	Associate of Technology
B.A.	Bachelor of Arts
B.E.M.T.	Bachelor of Engineering in Mining Technology
B.S.	Bachelor of Science
B.S. (N.E.)	Bachelor of Science in Nuclear Engineering
B.S. (N.E.S.)	Bachelor of Science (Nuclear Engineering Sciences)
B.S. (N.R.)	Bachelor of Science in Natural Resources
B.S.A.	Bachelor of Science in Agriculture
B.S.C.E.	Bachelor of Science in Civil Engineering
B.S.Ch.E.	Bachelor of Science in Chemical Engineering
B.S.E.	Bachelor of Science in Engineering
B.S.E.H.	Bachelor of Science in Environmental Health
B.S.E. (N.E.)	Bachelor of Science (Nuclear Engineering)
B.S.E.S.	Bachelor of Science in Engineering Sciences
B.S.N.E.	Bachelor of Science in Nuclear Engineering
B.T.	Bachelor of Technology
Cert.	Certificate

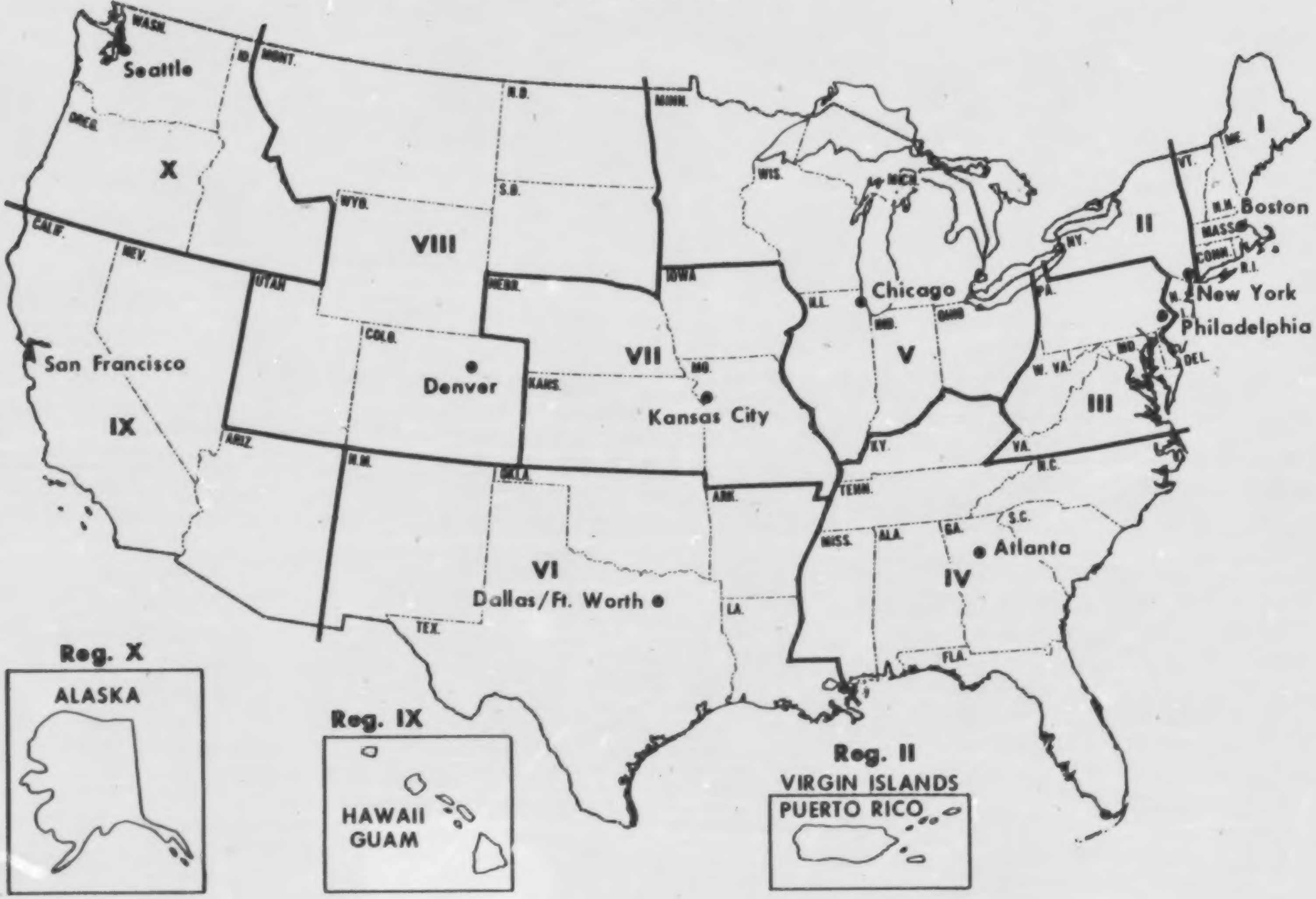
D.E.	Doctor of Engineering
D.P.H.	Doctor of Public Health
D.S.	Doctor of Science
D.S. (Hyg.)	Doctor of Science Hygiene
D.Sc.	Doctor of Science
Dr.P.H.	Doctor of Public Health
E.E.	Environmental Engineer
Eng.	Engineer
Engr.	Engineer
Engr.Sc.D.	Doctor of Engineering Science
Env.E.	Environmental Engineer
Envir.Eng.	Environmental Engineer
M.A.	Master of Arts
M.Ag.	Master of Agriculture
M.Agr.	Master of Agriculture
M.A.S.	Master of Applied Science
M.C.E.	Master of Civil Engineering
M.E.	Master of Engineering
M.E.E.E.	Master of Engineering in Environmental Engineering
M.E.A.S.	Master of Environmental Arts and Science
M.E.H.S.	Master of Environmental Health Sciences
M.E.M.	Master of Environmental Management
M.E.P.C.	Master in Environmental Pollution Control
M.Eng.	Master of Engineering
M.Engr.	Master of Engineering
M.F.	Master of Forestry
M.M.E.	Master of Mechanical Engineering
M.P.	Master of Philosophy
M.P.A.	Master of Public Affairs
M.P.H.	Master of Public Health
M.P.P.P.M.	Master of Plant Protection and Pest Management

M.P.S.	Master of Professional Studies
M.S.	Master of Science
M.S. (Hyg.)	Master of Science Hygiene
M.S.C.E.	Master of Science in Civil Engineering
M.S.Ch.E.	Master of Science in Chemical Engineering
M.S.E.	Master of Science in Engineering
M.S.E.E.	Master of Science in Environmental Engineering
M.S.En.E.	Master of Science in Environmental Engineering
M.S.Eng. S.	Master of Science in Environmental Engineering
M.S.Eng. Sci.	Master of Science in Engineering Science
M.S.E.H.	Master of Science in Environmental Health
M.S.E.M.P.	Master of Science in Energy Management and Policy
M.S.E.S.	Master of Science in Environmental Science (Studies)
M.S.P.H.	Master of Science in Public Health
M.S.(S.E.)	Master of Science in Sanitary Engineering
M.S.(S.S.)	Master of Science in Sanitary Science
N.E.	Nuclear Engineering
Nuc. Eng.	Nuclear Engineering
Ph.D.	Doctor of Philosophy
S.B.	Bachelor of Science
Sc.D.	Doctor of Science
S.M.	Master of Science

APPENDIX II

TERMINOLOGY

STANDARD REGIONAL BOUNDARIES
TEN REGIONS


WASH.
Seattle
ID.
MONT.
OREG.
X
N.D.
MINN.
S.D.
WYO.
VIII
CALIF.
NEV.
UTAH
NEBR.
IOWA
COLO.
Denver
KANS.
VII
MO.
Kansas City
San Francisco
IX
ARIZ.
N.M.
OKLA.
VI
Dallas/Ft. Worth
TEX.
ARK.
LA.
WIS.
MICH.
ILL.
Chicago
IND.
OHIO
V
KY.
TENN.
MISS.
ALA.
GA.
S.C.
Atlanta
IV
FLA.
N.C.
VA.
W. VA.
MD.
DEL.
III
PA.
N.J.
Philadelphia
N.Y.
New York
II
VT.
ME.
I
N.H.
Boston
MASS.
CONN.
R.I.
Reg. X
ALASKA
Reg. IX
HAWAII
GUAM
Reg. II
VIRGIN ISLANDS
PUERTO RICO

TERMINOLOGY

ACT (American College Testing) and SAT (Scholastic Aptitude Test) - Standardized examinations which are intended to provide applicants and institutions with a numerical statement of an individual's ability and readiness to successfully complete college/university level work.

Co-op program - A plan whereby a student receives financial assistance and academic credit under the direction of a cooperating employment site representative and a faculty advisor in exchange for an agreed upon condition of employment. Students must complete all degree requirements as per the norm.

Course - For the purpose of this study, a course is considered a unit of a program, in which a body of knowledge is presented, the satisfactory completion of which leads to the awarding of a predetermined or individually arranged number of credits.

ECPD (Engineers' Council for Professional Development) - Accrediting body for programs in engineering technology.

ERIC (Educational Resources Information Center) - A national information system designed and developed by the U.S. Office of Education, and now supported and operated by the National Institute of Education (NIE), for providing ready access to descriptions of exemplary programs, research and development efforts, and related information that can be used in developing more effective educational programs.

GRE (Graduate Record Examination) - (General Aptitude) An examination of verbal and mathematical competency and aptitude, which is designed to provide a numerical indication of an individual's ability to successfully complete advanced level work. For the purposes of the study, the GRE will not refer to the Advanced Examinations.

Internship/Applied Study Term - An arrangement which is intended to provide a simulation of work experience under the direction of academic advisors and is designed to be an integral segment of an individual's academic program. (College credit may be given.)

IRIS (Instructional Resources Information System) - A computerized information base listing materials relating to education and training in the water quality control field, which is located in the National Training and Operational Technology Center of the U.S. Environmental Protection Agency.

MEDLINE - Computerized literature search services with application to medical information.

NTIS (National Technical Information Service) - Computerized literature search services.

Program - For the purpose of this study, a plan of study, either completely prescribed, or containing options, with an identity of its own, and standard rules and procedures, the satisfaction of which may lead to a degree, certificate, or diploma.

Quarter hours - vs. - Semester hours - One semester hour is the credit equivalent to one and a half quarter hours.

Standard Federal Boundaries - Geographic division of the United States for the purposes of decentralized administration; in this report also referred to as EPA regions (see map on preceding page).

TOXLINE - Computerized literature search services with particular application to the recall of information concerning toxic substances.

WRSIC (Water Resources Scientific Information Center) - Collects, screens, organizes and disseminates reports in water resources.

APPENDIX III

SELECTED BIBLIOGRAPHY

SELECTED BIBLIOGRAPHY

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APPENDIX IV

PARTICIPATING INSTITUTIONS
BY
ENVIRONMENTAL CATEGORY

APPENDIX IV

PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
AIR	Carnegie-Mellon University	Pittsburgh, PA
	Clemson University	Clemson, SC
	Drexel University	Philadelphia, PA
	George Washington University-NASA	Hampton, VA
	Harvard University School of Public Health	Boston, MA
	Hudson Valley Community College	Troy, NY
	Massachusetts Institute of Technology	Ithaca, NY
	Michigan Technological University	Houghton, MI
	Middlesex County College	Edison, NJ
	Muskingum Area Technical College	Zanesville, OH
	New Jersey Institute of Technology	Newark, NJ
	North Carolina State University	Chapel Hill, NC
	North Dakota State School of Science	Wahpeton, ND
	Northeastern University	Boston, MA
	Ohio State University	Columbus, OH
	Portland State University	Portland, OR
	Prairie State Community College	Chicago Heights, IL
	Purdue University	West Layfayette, IN
	Rensselaer Polytechnic Institute	Troy, NY
	Rutgers-The State University of New Jersey	New Brunswick, NJ
	Springfield Technical Community College	Springfield, MA
	Stevens Institute of Technology	Hoboken, NJ
	Sumter University	Sumter, SC
	Syracuse University	Syracuse, NY
	Temple University	Philadelphia, PA
	The Pennsylvania State University	University Park, PA
	University of Cincinnati	Cincinnati, OH
	University of Delaware	Newark, DE
	University of Florida	Gainesville, FL
	University of Iowa	Iowa City, IA
	University of Kentucky	Lexington, KY
	University of Maryland	College Park, MD
	University of Michigan	Ann Arbor, MI
	University of Missouri-Rolla	Rolla, MO
	University of North Carolina	Chapel Hill, NC
	University of Pittsburgh	Pittsburgh, PA
	University of Tennessee	Knoxville, TN
	University of Texas-Austin	Austin, TX
	University of Washington	Seattle, WA
	University of Wisconsin-Milwaukee	Milwaukee, WI
	Vanderbilt University	Nashville, TN
	Washington State University	Pullman, WA
	Washington University	St. Louis, MO
	West Virginia University	Morgantown, WV
	Yale University	New Haven, CT

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
COMPOSITE:	Antioch College	Yellow Springs, OH
	Baylor University	Waco, TX
	Bemidji State University	Bemidji, MN
	California Institute of Technology	Pasadena, CA
	California Polytechnic State University	San Luis Obispo, CA
	Catholic University of America	Washington, DC
	Carnegie-Mellon University	Pittsburgh, PA
	Chattanooga State Technical Community College	Chattanooga, TN
	Clarkson College	Potsdam, NY
	Clemson University	Clemson, SC
	Cornell University	Ithaca, NY
	Delaware Technical and Community College	Newark, DE
	Delgado College	New Orleans, LA
	Drexel University	Philadelphia, PA
	Duke University	Durham, NC
	East Central Oklahoma State University	Ada, OK
	East Tennessee State University	Johnson City, TN
	Evergreen State College	Olympia, WA
	Ferris State College	Big Rapids, MI
	Florida International University	Miami, FL
	Georgia Institute of Technology	Atlanta, GA
	Heed University	Hollywood, FL
	Hocking Technical College	Nelsonville, OH
	Howard University	Washington, DC
	Hunter College	New York, NY
	Indiana University	Bloomington, IN
	Iowa State University	Ames, IA
	Johns Hopkins University	Baltimore, MD
	Kansas State University	Manhattan, KS
	Kirkwood Community College	Cedar Rapids, IA
	Lamar University	Beaumont, TX
	Macalester College	St. Paul, MN
	Massachusetts Institute of Technology	Cambridge, MA
	McNeese State University	Lake Charles, LA
	Miami University	Oxford, OH
	Michigan State University	East Lansing, MI
	Middle Tennessee State University	Murfreesboro, TN
	Morehead State University	Morehead, KY
	Muskingum Area Technical College	Zanesville, OH
	New Jersey Institute of Technology	Newark, NJ
	North Carolina State University	Raleigh, NC
	Northland College	Ashland, WI
	Ohio State University	Columbus, OH

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
COMPOSITE: (Cont'd)	Ohio University	Athens, OH
	Oscar Rose Junior College	Midwest City, OK
	OSU Oklahoma City Technical Institute	Oklahoma City, OK
	Polytechnical Institute of New York	Brooklyn, NY
	Princeton University	Princeton, NJ
	Purdue University	West Lafayette, IN
	Raymond Walters General and Technical College (University of Cincinnati	Cincinnati, OH
	Rensselaer Polytechnical Institute	Troy, NY
	Rutgers University	New Brunswick, NJ
	Sam Houston State University	Huntsville, TX
	Sangamon State University	Springfield, IL
	Slippery Rock State College	Slippery Rock, PA
	Springfield Technical and Community College	Springfield, MA
	Stevens Institute of Technology	Hoboken, NJ
	Syracuse University	Syracuse, NY
	Temple University	Philadelphia, PA
	Texas A & M University	College Station, TX
	The Cooper Union	New York, NY
	The Pennsylvania State University	University Park, PA
	University of Alabama	University, AL
	University of Alaska	Fairbanks, AK
	University of Arkansas	Fayetteville, AR
	University of California-Santa Barbara	Santa Barbara, CA
	University of Cincinnati	Cincinnati, OH
	University of Delaware	Newark, DE
	University of Florida	Gainesville, FL
	University of Georgia	Athens, GA
	University of Kansas	Lawrence, KS
	University of Louisville	Louisville, KY
	University of Maine-Orono	Orono, Maine
	University of Michigan	Ann Arbor, MI
	University of Minnesota	Minneapolis, MN
	University of North Carolina	Chapel Hill, NC
	University of Oklahoma	Norman, OK
	University of Pittsburgh	Pittsburgh, PA
	University of Tennessee	Knoxville, TN
	University of Toledo	Toledo, OH
	University of Utah	Salt Lake City, UT
	University of Washington	Seattle, WA
	University of Wisconsin-Green Bay	Green Bay, WI
	University of Wisconsin-Madison	Madison, WI
	Utah State University	Logan, UT

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
COMPOSITE: (Cont'd)	Vanderbilt University	Nashville, TN
	Virginia Polytechnic Institute and State University	Blacksburg, VA
	Washington State University	Pullman, WA
	Western Kentucky University	Bowling Green, KY
	Western Washington University (Huxley College of Environmental Studies)	Bellingham, WA
	West Virginia University	Morgantown, WV
	Yale University	New Haven, CT
ENERGY:	Bluefield State College	Bluefield, WV
	Brigham Young University	Provo, UT
	Carnegie-Mellon University	Pittsburgh, PA
	Columbia University	New York, NY
	Cornell University	New York, NY
	Georgia Institute of Technology	Atlanta, GA
	Hartford State Technical College	Hartford, CT
	Kansas State University	Manhattan, KS
	Lamar University	Beaumont, TX
	Massachusetts Institute of Technology	Cambridge, MA
	Morehead State University	Morehead, KY
	Muskingum Area Technical College	Zanesville, OH
	Oregon State University	Corvallis, OR
	Pikeville College	Pikeville, KY
	Polytechnic Institute of New York	Brooklyn, NY
	Princeton University	Princeton, NJ
	Purdue University	West Lafayette, IN
	Rensselaer Polytechnic Institute	Troy, NY
	Southern Technical Institute	Marietta, GA
	Texas State Technical Institute	Waco, TX
	The Pennsylvania State University	University Park, PA
	University of California-Berkeley	Berkeley, CA
	University of Florida	Gainesville, FL
	University of Kentucky	Lexington, KY
	University of New Mexico	Albuquerque, NM
	University of Pennsylvania	Philadelphia, PA
	University of Tennessee	Knoxville, TN
	West Virginia Institute of Technology	Montgomery, WV
	West Virginia University	Morgantown, WV

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
NOISE:	George Washington University-NASA	Hampton, VA
	Georgia Institute of Technology	Altanta, GA
	Massachusetts Institute of Technology	Cambridge, MA
	Memphis State University	Memphis, TN
	North Carolina State University	Raleigh, NC
	The Pennsylvania State University	University Park, PA
	University of Cincinnati	Cincinnati, OH
	University of Pittsburgh	Pittsburgh, PA
	University of Tennessee	Knoxville, TN
	University of Tennessee Center for Health Sciences	Memphis, TN
PESTICIDES:	Abraham Baldwin Agricultural College	Tifton, GA
	Broward Community College	Ft. Lauderdale, FL
	Central Technical Community College	Hastings, NE
	Delgado Community College	New Orleans, LA
	Harvard University School of Public Health	Boston, MA
	Mississippi State University	Mississippi State, MS
	New Mexico State University	Las Cruces, NM
	North Carolina State University	Raleigh, NC
	Ohio State University	Columbus, OH
	Oregon State University	Corvallis, OR
	Rutgers State University of New Jersey	New Brunswick, NJ
	State University of New York at Farmingdale	Farmingdale, NY
	Texas A & M University	College Station, TX
	The Pennsylvania State University	University Park, PA
	University of California-Berkeley	Berkeley, CA
	University of California-Davis	Davis, CA
	University of California-Riverside	Riverside, CA
	University of Cincinnati	Cincinnati, OH
	University of Delaware	Newark, DE
	University of Georgia	Athens, GA
	University of Iowa	Iowa City, IA
	University of Maryland	College Park, MD
	University of New Hampshire	Durham, NH
	University of Pittsburgh	Pittsburgh, PA
	University of Rochester	Rochester, NY
	Utah State University	Logan, UT

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
POTABLE WATER:	Atlanta University Center/Georgia Institute of Technology	Atlanta, GA
	Brigham Young University	Provo, UT
	California State University	Sacramento, CA
	Carnegie-Mellon University	Pittsburgh, PA
	Casper College	Casper, WY
	Central Technical Community College	Hastings, NE
	Clarkson College	Potsdam, NY
	Clemson University	Clemson, SC
	Colorado State University	Fort Collins, CO
	Community College of Denver-Red Rocks	Golden, CO
	Cornell University	Ithaca, NY
	Delgado College	New Orleans, LA
	Drexel University	Philadelphia, PA
	East Maine Vocational Technical Institute	Bangor, ME
	Hudson Valley Community College	Troy, NY
	Illinois Institute of Technology	Chicago, IL
	Iowa State University	Ames, IA
	J. Sargeant Reynolds Community College	Richmond, VA
	Kansas State University	Manhattan, KS
	Kirkwood Community College	Cedar Rapids, IA
	Linn-Benton Community College	Albany, OR
	Manhattan College	New York, NY
	Marquette University	Milwaukee, WI
	Massachusetts Institute of Technology	Cambridge, MA
	Miami-Dade Community College	Miami, FL
	Michigan Technological University	Houghton, MI
	Middlesex Community College	Edison, NJ
	Missouri Southern State College	Joplin, MO
	Montana State University	Bozeman, MT
	Muskingum Area Technical College	Zanesville, OH
	Northeastern University	Boston, MA
	Northern Montana College	Havre, MT
	Ohio State University	Columbus, OH
	Operator Training Center	Murfreesboro, TN
	Oregon Institute of Technology	Klamath Falls, OR
	Oscar Rose Junior College	Midwest City, OK
	Purdue University	West Lafayette, IN
	Rensselaer Polytechnic Institute	Troy, NY
	Rice University	Houston, TX
	Rochester Institute of Technology	Rochester, NY
	Rutgers State University of New Jersey	New Brunswick, NJ
	Southern Illinois University	Edwardsville, IL

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
POTABLE WATER: (Cont'd)	Springfield Technical Community College	Springfield, MA
	Stanford University	Stanford, CA
	State University of New York at Buffalo	Buffalo, NY
	Stevens Institute of Technology	Hoboken, NJ
	Sumter Technical Community College	Sumter, SC
	Syracuse University	Syracuse, NY
	Temple University	Philadelphia, PA
	Texas State Technical Institute	Waco, TX
	The Pennsylvania State University	University Park, PA
	The Pennsylvania State University/ Capitol Campus	Middletown, PA
	Tufts University	Boston, MA
	Ulster County Community College	Stone Ridge, NY
	University of California-Berkeley	Berkeley, CA
	University of Florida	Gainesville, FL
	University of Hawaii	Honolulu, HI
	University of Iowa	Iowa City, IA
	University of Kansas	Lawrence, KS
	University of Kentucky	Lexington, KY
	University of Maine at Orono	Orono, ME
	University of Michigan	Ann Arbor, MI
	University of Missouri-Columbia	Columbia, MO
	University of Missouri-Rolla	Rolla, MO
	University of Nebraska	Lincoln, NE
	University of North Carolina	Chapel Hill, NC
	University of Pennsylvania	Philadelphia, PA
	University of Pittsburgh	Pittsburgh, PA
	University of Rhode Island	Kingston, RI
	University of Tennessee	Knoxville, TN
	University of Texas-Austin	Austin, TX
	University of Wisconsin-Madison	Madison, WI
	University of Wyoming	Laramie, WY
	Utah State University	Logan, UT
	Vanderbilt University	Nashville, TN
	Virginia Polytechnic Institute and State University	Blacksburg, VA
	Water and Wastewater Technical School	Neosho, MO
	West Georgia College	Carrollton, GA
	West Virginia University	Morgantown, WV
	Wytheville Community College	Wytheville, VA

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
RADIATION:	Central Florida Community College	Ocala, FL
	Chattanooga State Technical Community College	Chattanooga, TN
	Columbia University	New York, NY
	Cornell University	Ithaca, NY
	Hartford State Technical College	Hartford, CT
	Harvard University School of Public Health	Boston, MA
	Kansas State University	Manhattan, KS
	Massachusetts Institute of Technology	Cambridge, MA
	Memphis State University	Memphis, TN
	Missouri Southern State College	Joplin, MO
	Oak Ridge Associated Universities	Oak Ridge, TN
	Oklahoma State University	Stillwater, OK
	Rensselaer Polytechnic Institute	Troy, NY
	Rutgers State University of New Jersey	New Brunswick, NJ
	St. Louis Community College at Forest Park	St. Louis, MO
	Southern Technical Institute	Marietta, GA
	The Pennsylvania State University	University Park, PA
	University of Florida	Gainesville, FL
	University of Kansas	Lawrence, KS
	University of Lowell	Lowell, MA
	University of Maryland	College Park, MD
	University of Michigan	Ann Arbor, MI
	University of North Carolina	Chapel Hill, NC
	University of Pittsburgh	Pittsburgh, PA
	University of Tennessee	Knoxville, TN
SOLID WASTE:	Carnegie-Mellon University	Pittsburgh, PA
	Clarkson College	Potsdam, NY
	Cornell University	New York, NY
	Drexel University	Philadelphia, PA
	Hofstra University	Hempstead, NY
	Michigan Technological University	Houghton, MI
	Rensselaer Polytechnic Institute	Troy, NY
	Temple University	Philadelphia, PA
	The Pennsylvania State University	University Park, PA
	University of Iowa	Iowa City, IA
	University of Missouri-Rolla	Rolla, MO
	University of Pittsburgh	Pittsburgh, PA
	Vanderbilt University	Nashville, TN
	West Virginia University	Morgantown, WV
	Wilson County Technical Institute	Wilson, NC
	Yale University	New Haven, CT

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PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
WASTEWATER:	Atlanta University Center/ Georgia Institute of Technology	Atlanta, GA
	Brigham Young University	Provo, UT
	California State University-Sacramento	Sacramento, CA
	Carnegie-Mellon University	Pittsburgh, PA
	Casper College	Casper, WY
	Central Technical Community College	Hastings, NE
	Charles County Community College	La Plata, MD
	Clarkson College	Potsdam, NY
	Clemson University	Clemson, SC
	Colorado State University	Fort Collins, CO
	Community College of Denver-Red Rocks	Golden, CO
	Cornell University	Ithaca, NY
	Delgado College	New Orleans, LA
	Drexel University	Philadelphia, PA
	East Maine Vocational Technical Institute	Bangor, ME
	Greenville Technical College	Greenville, SC
	Harvard University	Cambridge, MA
	Hudson Valley Community College	Troy, NY
	Illinois Institute of Technology	Chicago, IL
	Iowa State University	Ames, IA
	J. Sargeant Reynolds Community College	Richmond, VA
	Kansas State University	Manhattan, KS
	Kirkwood Community College	Cedar Rapids, IA
	Linn-Benton Community College	Albany, OR
	Manhattan College	New York, NY
	Marquette Technical University	Milwaukee, WI
	Massachusetts Institute of Technology	Cambridge, MA
	Miami-Dade Community College	Miami, FL
	Michigan Technological University	Houghton, MI
	Middlesex County College	Edison, NJ
	Missouri Southern State College	Joplin, MO
	Montana State University	Bozeman, MT
	Muskingum Area Technical College	Zanesville, OH
	New England Regional Wastewater Institute	S. Portland, ME
	New Jersey Institute of Technology	Newark, NJ
	Northeastern University	Boston, MA
	Northern Montana College	Havre, MT
	Ohio State University	Columbus, OH
	Operator Training Center	Murfreesboro, TN
	Oregon Institute of Technology	Klamath Falls, OR
	Oscar Rose Junior College	Midwest City, OK

APPENDIX IV

PARTICIPATING INSTITUTIONS BY ENVIRONMENTAL CATEGORY

CATEGORY	INSTITUTION	LOCATION
WASTEWATER: (Cont'd)	Purdue University	West Lafayette, IN
	Rensselaer Polytechnic Institute	Troy, NY
	Rice University	Houston, TX
	Rochester University	Rochester, NY
	Rutgers State University of New Jersey	New Brunswick, NJ
	Southern Illinois University	Edwardsville, IL
	Springfield Technical and Community College	Springfield, MA
	Stanford University	Stanford, CA
	State Technical Institute at Memphis	Memphis, TN
	State University of New York-Buffalo	Buffalo, NY
	Stevens Institute of Technology	Hoboken, NJ
	Sumter Technical Community College	Sumter, SC
	Syracuse University	Syracuse, NY
	Temple University	Philadelphia, PA
	Texas State Technical Institute	Waco, TX
	The Pennsylvania State University	University Park, PA
	The Pennsylvania State University/ Capitol Campus	Middletown, PA
	Tufts University	Boston, MA
	Ulster County Community College	Stone Ridge, NY
	University of California-Berkeley	Berkeley, CA
	University of Florida	Gainesville, FL
	University of Hawaii	Honolulu HI
	University of Kansas	Lawrence, KS
	University of Kentucky	Lexington, KY
	University of Lowell	Lowell, MA
	University of Maine at Orono	Orono, ME
	University of Missouri-Columbia	Columbia, MO
	University of Missouri-Rolla	Rolla, MO
	University of Nebraska	Lincoln, NE
	University of North Carolina	Chapel Hill, NC
	University of Pittsburgh	Pittsburgh, PA
	University of Rhode Island	Kingston, RI
	University of Tennessee	Knoxville, TN
	University of Texas	Austin, TX
	University of Wisconsin-Madison	Madison, WI
	University of Wyoming	Laramie, WY
	Utah State University	Logan, UT
	Vanderbilt University	Nashville, TN
	Virginia Polytechnic Institute and State University	Blacksburg, VA
	Water and Wastewater Technical School	Neosho, MO
	West Georgia College	Carrollton, GA
	West Virginia University	Morgantown, WV
	Wytheville Community College	Wytheville, VA

APPENDIX V

COLLEGE CATALOGS REVIEWED

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
AL	Alabama A & M University	Huntsville
	Alabama Christian College	Montgomery
	Alabama Lutheran Junior College	Selma
	Alexander City State Junior College	Alexander City
	Athens State College	Athens
	Auburn University	Auburn
	Auburn University at Montgomery	Montgomery
	Birmingham-Southern College	Birmingham
	Brewer State Junior College	Fayette
	Enterprise State Junior College	Enterprise
	Faulkner State Junior College	Bay Minette
	Gadsden State Junior College	Gadsden
	George C. Wallace State Community College	Dothan
	George C. Wallace State Community College	Selma
	Jacksonville State University	Jacksonville
	Jefferson Davis State Junior College	Brewton
	Jefferson State Junior College	Birmingham
	John C. Calhoun State Community College	Decatur
	Judson College	Marion
	Livingston University	Livingston
	Lawson State Community College	Birmingham
	Lurleen B. Wallace State Junior College	Andalusia
	Marion Military Institute	Marion
	Miles College	Birmingham
	Mobile College	Mobile
	Northeast Alabama State Junior College	Rainsville
	Northwest Alabama State Junior College	Phil Campbell
	Oakwood College	Huntsville
	Samford University	Birmingham
	Selma University	Selma
	Snead State Junior College	Boaz
	Southeastern Bible College	Birmingham
	Southern Benedictine College	Saint Bernard
	Southern Union State Junior College	Wadley
	Spring Hill College	Mobile
	Stillman College	Tuscaloosa
	Talladega College	Talladega
	Troy State University	Troy
	Tuskeegee Institute	Tuskeegee Institute
	University of Alabama	University
	University of Alabama in Birmingham	Birmingham
	University of Alabama in Huntsville	Huntsville
	University of Montevallo	Montevallo
	University of North Alabama	Florence
	University of South Alabama	Mobile
	Walker College	Jasper
AK	Sheldon Jackson College	Sitka
	University of Alaska-Fairbanks	Fairbanks
	University of Alaska Juneau Senior College	Juneau
AS	American Samoa Community College	Pago Pago
AZ	American Graduate School of International Management	Glendale
	Arizona State University	Tempe
	Arizona Western College	Yuma

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Central Arizona College	Coolidge
	Cochise College	Douglas
	College of Ganado	Ganado
	DeVry Institute of Technology	Phoenix
	Eastern Arizona College	Thatcher
	Grand Canyon College	Phoenix
	Maricopa County Community College System Office	Phoenix
	Glendale Community College	Glendale
	Maricopa Technical Community College	Phoenix
	Mesa Community College	Mesa
	Phoenix College	Phoenix
	Scottsdale Community College	Scottsdale
	Mohave Community College	Kingman
	Navajo Community College	Tsaile
	Northern Arizona University	Flagstaff
	Northland Pioneer College	Holbrook
	Pima Community College	Tucson
	Southwestern College	Phoenix
	University of Arizona	Tucson
	Yavapai College	Prescott
AR	Arkansas College	Batesville
	Arkansas State University-Main Campus	State University
	Arkansas State University-Beebe Branch	Beebe
	Arkansas Tech University	Russellville
	Central Baptist College	Conway
	College of the Ozarks	Clarksville
	Crowley's Ridge College	Paragould
	Garland County Community College	Hot Springs
	Harding College-Main Campus	Searcy
	Henderson State University	Arkadelphia
	Hendrix College	Conway
	John Brown University	Siloam Springs
	Mississippi County Community College	Blytheville
	Quachita Baptist University	Arkadelphia
	Philander Smith College	Little Rock
	Phillips County Community College	Helena
	Southern Arkansas University	Magnolia
	Southern Arkansas University Southwest Technical Institute	East Camden
	Southern Baptist College	Walnut Ridge
	Southern State College	Magnolia
	University of Arkansas-Main Campus	Fayetteville
	University of Arkansas-Little Rock	Little Rock
	University of Arkansas Medical Sciences Campus	Little Rock
	University of Arkansas-Monticello	Monticello
	Westlark Community College	Fort Smith
CA	Allan Hancock College	Santa Maria
	Ambassador College	Pasadena
	American Baptist Seminary of the West-Central Office	Berkeley
	American Baptist Seminary of the West-Covina	Covina
	Armstrong College	Berkeley
	Azusa Pacific College	Azusa
	Bakersfield College	Bakersfield
	Barstow College	Barstow
	Bauder College	Sacramento
	Bethany Bible College	Santa Cruz
	Biola College	La Mirada
	Brooks College	Long Beach

APPENDIX V
CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Brooks Institute of Santa Barbara	Santa Barbara
	Butte College	Oroville
	Cabrillo College	Aptos
	California Baptist College	Riverside
	California College of Arts and Crafts	Oakland
	California Institute of the Arts	Valencia
	California Institute of Asian Studies	San Francisco
	California Institute of Technology	Pasadena
	California Lutheran College	Thousand Oaks
	California Maritime Academy	Vallejo
	California State College-San Bernadino	San Bernardino
	California State College-Stanislaus	Turlock
	California Polytechnic State University-San Luis Obispo	San Luis Obispo
	California State University-Fresno	Fresno
	California State University-Fullerton	Fullerton
	California State University-Hayward	Hayward
	California State University-Long Beach	Long Beach
	California State University-Los Angeles	Los Angeles
	California State University-Sacramento	Sacramento
	San Diego State University	San Diego
	San Jose State University	San Jose
	Cerritos College	Norwalk
	Cerro Coso Community College	Ridgecrest
	Chapman College	Orange
	Christian Heritage College	El Cajon
	Church Divinity School of the Pacific	Berkeley
	Citrus College	Azusa
	Claremont Colleges-System Office	Claremont
	Claremont Men's College	Claremont
	Claremont University Center and Graduate School	Claremont
	Harvey Mudd College	Claremont
	Pitzer College	Claremont
	Pomona College	Claremont
	Scripps College	Claremont
	Coast Community College-System Office	Costa Mesa
	Golden West College	Huntington Beach
	Orange Coast College	Costa Mesa
	Cogswell College	San Francisco
	Colegio De La Tierra	Goshen
	College of the Canyons	Valencia
	College of the Desert	Palm Desert
	College of Marin	Kentfield
	College of Notre Dame	Belmont
	College of the Redwoods	Eureka
	College of the Siskiyous	Weed
	Columbia Junior College	Columbia
	Compton Community College	Compton
	Contra Costa Community College-System Office	
	Diablo Valley College	Pleasant Hill
	Cuesta College	San Luis Obispo
	Cypress College	Cypress
	Dominican College of San Rafael	San Rafael
	El Camino College	Torrance
	Foothill-De Anza Community College District-System Office	Los Altos Hills
	De Anza College	Cupertino
	Foothill College	Los Altos Hills
	Fuller Theological Seminary	Pasadena
	Gavilan College	Gilroy
	Glendale Community College	Glendale
	Golden Gate University	San Francisco
	Grossmont College	El Cajon
	Hartnell College	Salinas
	Holy Family College	Mission San Jose

APPENDIX V
CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Holy Names College	Oakland
	Immaculate Heart College	Los Angeles
	Indian Valley Colleges	Novato
	John F. Kennedy University	Orinda
	Lake Tahoe Community College	S. Lake Tahoe
	Lassen College	Susanville
	LaVerne College	La Verne
	L.I.F.E. Bible College	Los Angeles
	Lincoln University	San Francisco
	Lone Mountain College	San Francisco
	Long Beach City College	Long Beach
	Los Angeles Baptist College	Newhall
	Los Angeles Community College-	
	System Office	Los Angeles
	East Los Angeles College	Los Angeles
	Los Angeles City College	Los Angeles
	Los Angeles Harbor College	Wilmington
	Los Angeles Mission College	San Fernando
	Los Angeles Pierce College	Woodland Hills
	Los Angeles Southwest College	Los Angeles
	Los Angeles Valley College	Van Nuys
	West Los Angeles College	Culver City
	Los Rios Community College-	
	System Office	Sacramento
	Cosumnes River College	Sacramento
	Sacramento City College	Sacramento
	Loyla Marymount University	Los Angeles
	Marymount Palos Verdes College	Rancho Palos Verdes
	Mendocino College	Ukiah
	Menlo College	Menlo Park
	Mennonite Brethren Biblical Seminary	Fresno
	Merced College	Merced
	Mills College	Oakland
	Monterey Institute for Foreign Studies	Monterey
	Monterey Peninsula College	Monterey
	Mount San Antonio College	Walnut
	Mount San Jacinto College	San Jacinto
	Napa College	Napa
	National University	San Diego
	New College of California	San Francisco
	Northrop University	Inglewood
	Occidental College	Los Angeles
	Ohlone College	Fremont
	Otis Art Institute of Los Angeles County	Los Angeles
	Pacific Christian College	Fullerton
	Pacific College	Fresno
	Pacific Oaks College	Pasadena
	Pacific School of Religion	Berkeley
	Pacific Union College	Angwin
	Palomar College	San Marcos
	Palo Verde College	Blythe
	Pasadena City College	Pasadena
	Patten Bible College	Oakland
	Pepperdine University	Malibu
	Peralta Community Colleges-System Office	Oakland
	College of Alameda	Alameda
	Point Loma College	San Diego
	Porterville College	Porterville
	Rand Graduate Institute of Policy Studies	Santa Monica
	Riverside City College	Riverside
	Rosemead Graduate School of Psychology	Rosemead
	Saddleback Community College	Mission Viejo
	Saint Mary's College of California	Moraga

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Saint Patrick's College	Mountain View
	San Diego Community College-Central Office	San Diego
	San Diego Community College-City College	San Diego
	San Diego Community College-Evening College	
	San Francisco Art Institute	San Francisco
	San Francisco Conservatory of Music	San Francisco
	San Francisco Theological Seminary	San Anselmo
	San Joaquin Delta College	Stockton
	San Jose Community College District-	
	Evergreen Valley College	San Jose
	San Jose City College	San Jose
	San Mateo County Community College District-System Office	San Mateo
	Canada College	Redwood City
	College of San Mateo	San Mateo
	Skyline College	San Bruno
	Santa Ana College	Santa Ana
	Santa Barbara City College	Santa Barbara
	Santa Monica College	Santa Monica
	Santa Rosa Junior College	Santa Rosa
	Shasta College	Redding
	Sierra College	Rocklin
	Simpson College	San Francisco
	Solano Community College	Suisun City
	Southern California College	Costa Mesa
	Southern California College of Optometry	Fullerton
	Southwestern University School of Law	Los Angeles
	Stanford University	Stanford
	State Center Community College District	
	Fresno City College	Fresno
	Reedley College	Reedley
	Taft College	Taft
	United States International University	San Diego
	University of California-Berkeley	Berkeley
	University of California-Davis	Davis
	University of California Hastings College of Law	San Francisco
	University of California-Irvine	Irvine
	University of California-Los Angeles	Los Angeles
	University of California-Riverside	Riverside
	University of California-San Francisco	San Francisco
	University of California-Santa Barbara	Santa Barbara
	University of the Pacific	Stockton
	University of Redlands	Redlands
	University of San Diego	San Diego
	University of San Francisco	San Francisco
	University of Santa Clara	Santa Clara
	University of Southern California	Los Angeles
	University of West Los Angeles	Culver City
	Ventura County Community College District	
	Moorpark College	Moorpark
	Oxnard College	Oxnard
	Ventura College	Ventura
	West Coast Bible College	Fresno
	West Coast University Central Office	Los Angeles
	West Coast University Orange County Center	Orange
	Western State University College of Law-Orange County	Fullerton
	Western State University College of Law-San Diego	San Diego
	West Hills College	Coalinga
	Westmont College	Santa Barbara
	West Valley College	Saratoga

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Whittier College	Whittier
	Woodbury University	Los Angeles
	The Wright Institute	Berkeley
	Yuba College	Marysville
CO	Adams State College	Alamosa
	Aims Community College	Greeley
	Arapahoe Community College	Littleton
	Colorado College	Colorado Springs
	Colorado Mountain College-East Campus	Leadville
	Colorado Mountain College-West Campus	Glenwood Springs
	Colorado School of Mines	Golden
	Colorado State University	Fort Collins
	Colorado Technical College	Manitou Springs
	Colorado Women's College	Denver
	Community College of Denver-Auraria Campus	Denver
	Community College of Denver-North Campus	Denver
	Community College of Denver-Red Rocks Campus	Golden
	Conservative Baptist Theological Seminary	Denver
	El Paso Community College	Colorado Springs
	Fort Lewis College	Durango
	Iliff School of Theology	Denver
	Lamar Community College	Lamar
	Loretto Heights College	Denver
	Mesa College	Grand Junction
	Metropolitan State College	Denver
	Morgan Community College	Fort Morgan
	Northeastern Junior College	Sterling
	Ortero Junior College	La Junta
	Regis College	Denver
	Rockmont College	Denver
	Saint Thomas Seminary	Denver
	Trinidad State Junior College	Trinidad
	University of Colorado-Boulder	Boulder
	University of Colorado-Colorado Springs	Colorado Springs
	University of Colorado-Denver	Denver
	University of Denver	Denver
	University of Denver College of Law	Denver
	University of Northern Colorado	Greeley
	University of Southern Colorado	Pueblo
	Western Bible College	Morrison
	Western State College of Colorado	Gunnison
CT	Albertus Magnus College	New Haven
	Annhurst College	Woodstock
	Bridgeport Engineering Institute	Bridgeport
	Connecticut College	New London
	Eastern Connecticut State College	Willimnatic
	Greater Hartford Community College	Hartford
	Hartford State Technical College	Hartford
	Housatonic Regional Community College	Bridgeport
	Mattuck Community College	Waterbury
	Middlesex Community College	Middletown
	Mitchell College	New London
	Mohegan Community College	Norwich
	Northwestern Connecticut Community College	Winsted
	Norwalk Community College	Norwald
	Post Junior College	Waterbury
	Quinebaug Valley Community College	Danielson
	Saint Joseph College	West Hartford

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Thames Valley State Technical College	Norwich
	Trinity College	Hartford
	Tunxis Community College	Farmington
	University of Bridgeport	Bridgeport
	University of Hartford	West Hartford
	University of New Haven	West Haven
	Yale University	New Haven
DE	Delaware State College	Dover
	Delaware Technical and Community College	Dover
	Goldey Beacom College	Wilmington
	University of Delaware	Newark
	Wesley College	Dover
DC	American University	Washington
	Catholic University of America	Washington
	District of Columbia Teachers College	Washington
	Gallaudet College	Washington
	George Washington University	Washington
	Howard University	Washington
	Mount Vernon College	Washington
	Trinity College	Washington
FL	Barry College	Miami
	Brevard Community College	Cocoa
	Broward Community College	Fort Lauderdale
	Central Florida Community College	Ocala
	Chipola Junior College	Marianna
	College of Boca Raton	Boca Raton
	Daytona Beach Community College	Daytona Beach
	Eckerd College	St. Petersburg
	Edison Community College	Fort Meyers
	Embry-Riddle Aeronautical University	Daytona Beach
	Flagler College	St. Augustine
	Florida A & M University	Tallahassee
	Florida Atlantic University	Boca Raton
	Florida College	Temple Terrace
	Florida International University	Miami
	Florida Junior College	Jacksonville
	Florida Keys Community College	Key West
	Florida Southern College	Lakeland
	Florida Technological University	Orlando
	Fort Lauderdale College	Fort Lauderdale
	Gulf Coast Community College	Panama City
	Heed University	Hollywood
	Hillsborough Community College	Tampa
	Indian River Community College	Fort Pierce
	Jacksonville University	Jacksonville
	Jones College	Jacksonville
	Lake City Community College	Lake City
	Lake-Sumter Community College	Leesburg
	Manatee Junior College	Bradenton
	Miami Christian College	Miami
	Miami-Dade Community College	Miami
	North Florida Junior College	Madison
	Nova University	Fort Lauderdale
	Okaloosa-Walton Junior College	Niceville
	Palm Beach Atlantic College	West Palm Beach
	Palm Beach Junior College	Lake Worth
	Pensacola Junior College	Pensacola
	Polk Community College	Winter Haven

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Rollins College	Winter Park
	Saint Johns River Junior College	Palatka
	Saint Leo College	Saint Leo
	Santa Fe Community College	Gainesville
	Seminole Community College	Sanford
	South-Eastern Bible College	Lakeland
	South Florida Junior College	Avon Park
	University of Florida	Gainesville
	University of Miami	Coral Gables
	University of North Florida	Jacksonville
	Warner Southern College	Lake Wales
	Webber College	Babson Park
GA	Abraham Baldwin Agricultural College	Tifton
	Agnes Scott College	Decatur
	Albany Area Vocational Technical School	Albany
	Albany Junior College	Albany
	Albany State College	Albany
	Andrew College	Cuthbert
	Armstrong State College	Savannah
	Atlanta Christian College	East Point
	Atlanta Junior College	Atlanta
	Atlanta University	Atlanta
	Augusta College	Augusta
	Bainbridge Junior College	Bainbridge
	Berry College	Mount Berry
	Brenau College	Gainesville
	Brewton-Parker College	Mount Vernon
	Carroll County Area Vocational-Technical School	Carrollton
	Carver Bible Institute and College	Atlanta
	Clark College	Atlanta
	Clayton Junior College	Morrow
	Columbus College	Columbus
	Dalton Junior College	Dalton
	DeKalb Community College	Clarkston
	Emanuel County Junior College	Swainsboro
	Emory University	Atlanta
	Fort Valley State College	Fort Valley
	Gainesville Junior College	Gainesville
	Georgia College	Milledgeville
	Georgia Institute of Technology	Atlanta
	Georgia Military College	Milledgeville
	Georgia Southern College	Statesboro
	Georgia Southwestern College	Americus
	Georgia State University	Atlanta
	Gordon Junior College	Barnesville
	Kennesaw Junior College	Marietta
	LaGrange College	LaGrange
	Macon Junior College	Macon
	Marietta-Cobb Area Vocational Technical School	Marietta
	Mercer University	Macon
	Mercer University in Atlanta	Atlanta
	Middle Georgia College	Cochran
	Morehouse College	Atlanta
	Moultrie Area Vocational-Technical School	Moultrie
	North Georgia College	Dahlonega
	North Georgia Technical and Vocational School	Clarkesville
	Oglethorpe College	Atlanta
	Pickens Area Vocational-Technical School	Jasper
	Piedmont College	Demorest
	Reinhardt College	Waleska

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Savannah Area Vocational Technical School	Savannah
	Savannah State College	Savannah
	Shorter College	Rome
	South Georgia College	Douglas
	South Georgia Technical and Vocational School	Americus
	Southern Technical Institute	Marietta
	Swainsboro Area Vocational-Technical School	Swainsboro
	Thomas Area Vocational-Technical School	Thomasville
	Tift College	Forsyth
	Toccoa Falls College	Toccoa Falls
	Troup County Area Vocational Technical School	LaGrange
	Truett McConnell College	Cleveland
	University of Georgia	Athens
	Upson County Area Vocational-Technical School	Thomaston
	Valdosta State College	Valdosta
	Valdosta Technical School	Valdosta
	Walker County Area Technical School	Rock Spring
	Waycross-Ware Area Technical School	Waycross
	Wesleyan College	Macon
	West Georgia College	Carrollton
	Young Harris College	Young Harris
HI	Brigham Young University-Hawaii Campus	Laie Oahu
	Chaminade College of Honolulu	Honolulu
	Hawaii Pacific College	Honolulu
	University of Hawaii-Honolulu Community College	Honolulu
	University of Hawaii-Kapiolani Community College	Honolulu
	University of Hawaii-Kauai Community College	Lihue
	University of Hawaii-Leeward Community College	Pearl City
	University of Hawaii-Manoa	Honolulu
	University of Hawaii-Maui Community College	Kahului
	University of Hawaii-Windward Community College	Kaneohe
ID	Boise State University	Boise
	College of Southern Idaho	Twin Falls
	Idaho State University	Pocatello
	North Idaho College	Coeur D'Alene
	Northwest Nazarene College	Nampa
	Ricks College	Rexburg
	University of Idaho	Moscow
IL	Augustana College	Rock Island
	Aurora College	Aurora
	Barat College	Lake Forest
	Belleville Area College	Belleville
	Blackburn College	Carlinville
	Black Hawk College	Moline
	Bradley University	Peoria
	Carl Sandburg College	Galesburg
	Central YMCA Community College	Chicago
	Chicago College of Osteopathic Medicine	Chicago
	Chicago State University	Chicago
	College of DuPage	Glen Ellyn

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	College of Lake County	Grayslake
	College of St. Francis	Joliet
	College of the University of Chicago	Chicago
	Danville Junior College	Danville
	DeLourdes College	Des Plaines
	DePaul University	Chicago
	DeVry Institute of Technology	Chicago
	Eastern Illinois University	Charleston
	Elgin Community College	Elgin
	Elmhurst College	Elmhurst
	Eureka College	Eureka
	George Williams College	Downers Grove
	Governors State University	Park Forest South
	Greenville College	Greenville
	Highland Community College	Freeport
	Illinois Benedictine College	Lisle
	Illinois Central College	East Peoria
	Illinois College	Jacksonville
	Illinois College of Optometry	Chicago
	Illinois College of Podiatric Medicine	Chicago
	Illinois Institute of Technology	Chicago
	Illinois State University	Normal
	Illinois Valley Community College	Oglesby
	Illinois Wesleyan University	Bloomington
	Joliet Junior College	Joliet
	Judson College	Elgin
	Kankakee Community College	Kankakee
	Kendall College	Evanston
	Kishwaukee College	Malta
	Knox College	Galesburg
	Lake Forest College	Evanston
	Lakeland College	Mattoon
	Lewis and Clark Community College	Godfrey
	Lincoln Trail College	Robinson
	Logan (John A.) College	Carterville
	Loyola University of Chicago	Chicago
	MacMurray College	Jacksonville
	McHenry County College	Crystal Lake
	McKendree College	Lebanon
	Meadville Theological School	Lombard
	Millikin University	Decatur
	Moraine Valley Community College	Palos Hills
	National College of Chiropractic	Lombard
	North Central College	Naperville
	Northeastern Illinois University	Chicago
	Northern Baptist Theological Seminary	Lombard
	Northern Illinois University	DeKalb
	Northwestern University	Evanston
	Oakton Community College	Morton Grove
	Olivet Nazarene College	Kankakee
	Olney Central College	Mt. Carmel
	Prairie State Community College	Chicago Heights
	Rockford College	Rockford
	Rock Valley College	Rockford
	Roosevelt University	Chicago
	Rush University, College of Nursing and Allied Health Sciences	Chicago
	Rush University, Rush Medical College	Chicago
	Sangamon State University	Springfield
	Sauk Valley College	Dixon
	Southern Illinois University	Carbondale
	Southern Illinois University	Edwardsville
	Spertus College of Judaica	Chicago
	Spoon River College	Canton
	Springfield College in Illinois	Springfield

APPENDIX V
CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	State Community College of East Saint Louis, Illinois	East St. Louis
	Thornton Community College	South Holland
	Triton College	River Grove
	University of Health Sciences, The Chicago Medical School	Chicago
	University of Illinois at Chicago Circle	Chicago
	University of Illinois at the Medical Center, School of Public Health	Chicago
	University of Illinois at Urbana-Champaign	Urbana-Champaign
	Wabash Valley College	Mt. Carmel
	Waubonsee Community College	Sugar Grove
	Western Illinois University	Macomb
	Wheaton College	Wheaton
	William Rainey Harper College	Palatine
IN	Anderson College	Anderson
	Associated Mennonite Biblical Seminary	Elkhart
	Ball State University	Muncie
	Bethel College	Mishawaka
	Butler University	Indianapolis
	DePauw University	Greencastle
	Earlham College	Richmond
	Franklin College	Franklin
	Goshen College	Goshen
	Grace College	Winona Lake
	Hanover College	Hanover
	Holy Cross Junior College	Notre Dame
	Huntington College	Huntington
	Indiana Central College	Indianapolis
	Indiana Institute of Technology	Fort Wayne
	Indiana State University	Evansville
	Indiana University	Bloomington
	Indiana University-East	Richmond
	Indiana University-Kokomo	Kokomo
	Indiana University-Northwest	Gary
	Indiana University-South Bend	South Bend
	Indiana University-Southeast	New Albany
	Indiana University-Purdue University at Fort Wayne	Fort Wayne
	Indiana Vocational Technical College	Indianapolis
	International Junior College	Fort Wayne
	Manchester College	North Manchester
	Marian College	Indianapolis
	Marion College	Marion
	Oakland College	Oakland City
	Purdue State University	Muncie
	Purdue University	West Lafayette
	Purdue University-Calumet	Calumet
	Purdue University-North Central	Westville
	Rose-Hulman Institute of Technology	Terre Haute
	Saint Joseph's College	Rensselaer
	Saint Mary's College	Notre Dame
	Saint Mary of the Woods College	Saint Mary of the Woods
	Saint Meinard College	St. Meinard
	Taylor University	Upland
	Tri-State University	Angola
	University of Evansville	Evansville
	University of Notre Dame	South Bend
	Valparaiso University	Valparaiso
	Vincennes University	Vincennes
	Wabash College	Crawfordsville

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
IA	Area One Vocational-Technical School	Calmar and Dubuque
	Briar Cliff College	Sioux City
	Central College	Pella
	Clarke College	Dubuque
	Coe College	Cedar Rapids
	Cornell College	Mt. Vernon
	Des Moines Area Community College	Ankeny
	Drake University	Des Moines
	Ellsworth Community College	Iowa Falls
	Grinnell College	Grinnell
	Hawkeye Institute of Technology	Waterloo
	Iowa Central Community College	Fort Dodge
	Iowa Lakes Community College	Estherville
	Iowa State University	Ames
	Iowa Wesleyan College	Mount Pleasant
	Iowa Western Community College	Council Bluffs
	Kirkwood Community College	Cedar Rapids
	Loras College	Dubuque
	Luther College	Decorah
	Marshalltown Community College	Marshalltown
	Marycrest College	Davenport
	Morningside College	Sioux City
	Mount Mercy College	Cedar Rapids
	North Iowa Area Community College	Mason City
	Open Bible College	Des Moines
	Palmer College of Chiropractic	Davenport
	Simpson College	Indianola
	Southeastern Community College	Burlington
	Southwestern Community College	Creston
	University of Dubuque	Dubuque
	University of Dubuque Theological Seminary	Dubuque
	University of Iowa	Iowa City
	University of Northern Iowa	Cedar Falls
	Upper Iowa University	Fayette
	Wartburg College	Waverly
	Wartburg Seminary	Dubuque
	Westmar College	LeMars
	Western Iowa Technical Community College	Sioux City
KS	Allen County Community Junior College	Iola
	Baker University	Baldwin
	Barton County Community College	Great Bend
	Benedictine College	Atchison
	Bethel College	North Newton
	Central College	McPherson
	Cloud County Community College	Concordia
	Coffeyville Community Junior College	Coffeyville
	Colby Community College	Colby
	Cowley County Community College	Arkansas City
	Dodge City Community College	Dodge City
	Donnelly College	Kansas City
	Emporia Kansas State College	Emporia
	Fort Hays Kansas State College	Hays
	Fort Scott Community College	Fort Scott
	Friends Bible College	Haviland
	Garden City Community College	Garden City
	Haskell Indian Junior College	Lawrence
	Hesston College	Hesston
	Highland Community Junior College	Highland
	Hutchinson Community Junior College	Hutchinson
	Independence Community Junior College	Independence
	Johnson County Community College	Overland Park
	Kansas City Community College	Kansas City

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Kansas Newman College	Wichita
	Kansas State College of Pittsburg	Pittsburg
	Kansas State University	Manhattan
	Kansas Technical Institute	Salina
	Kansas Wesleyan	Salina
	Labette Community Junior College	Parsons
	Manhattan Christian College	Manhattan
	Marymount College of Kansas	Salina
	McPherson College	McPherson
	Mid-America Nazarene College	Olathe
	Neosho County Community Junior College	Chanute
	Ottawa University	Ottawa
	Pratt Community College	Pratt
	Saint John's College	Winfield
	Saint Mary College	Leavenworth
	Saint Mary of the Plains College	Dodge City
	Seward County Community College	Liberal
	Southwestern College in Kansas	Winfield
	Sterling College	Sterling
	Tabor College	Hillsboro
	The University of Kansas	Lawrence
	Washburn University of Topeka	Topeka
	Wichita State University	Wichita
KY	Alice Lloyd College	Pippa Passes
	Asbury College	Wilmore
	Bellarmine College	Louisville
	Berea College	Berea
	Brescia College	Owensboro
	Campbellsville College	Campbellsville
	Centre College of Kentucky	Danville
	Cumberland College	Williamsburg
	Eastern Kentucky University	Richmond
	Georgetown College	Georgetown
	Jefferson Vocational Regional Office	Jeffersontown
	Kentucky Christian College	Grayson
	Kentucky State University	Frankfort
	Kentucky Wesleyan College	Owensboro
	Lees Junior College	Jackson
	Lindsey Wilson College	Columbia
	Midway College	Midway
	Morehead State University	Morehead
	Murray State University	Murray
	Pikeville College	Pikeville
	Saint Catharine College	Saint Catharine
	Southeastern Christian College	Winchester
	Sue Bennett College	London
	Thomas More College	Fort Mitchell
	Transylvania University	Lexington
	University of Kentucky	Lexington
	University of Kentucky Community College System	Lexington
	University of Louisville	Louisville
	Western Kentucky University	Bowling Green
LA	Bossier Parish Community College	Bossier City
	Centenary College of Louisiana	Shreveport
	Delgado College	New Orleans
	Dillard University	New Orleans
	Grambling State University	Grambling
	Louisiana State University-Central Office	Baton Rouge

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Louisiana State University and Agricultural and Mechanical College at Baton Rouge	Baton Rouge
	Louisiana State University-Alexandria	Alexandria
	Louisiana State University-Eunice	Eunice
	Louisiana State University-Shreveport	Shreveport
	University of New Orleans	New Orleans
	Louisiana Tech University	Ruston
	McNeese State University	Lake Charles
	New Orleans Baptist Theological Seminary	New Orleans
	Northeast Louisiana University	Monroe
	Northwestern State University of Louisiana	Natchitoches
	Notre Dame Seminary School of Theology	New Orleans
	Our Lady of Holy Cross College	New Orleans
	Saint Bernard Parish Community College	Chalmette
	Saint Joseph Seminary College	Saint Benedict
	Saint Mary's Dominican College	New Orleans
	Southern University in New Orleans	New Orleans
	Tulane University of Louisiana	New Orleans
	Xavier University of Louisiana	New Orleans
ME	Bowdoin College	Brunswick
	Colby College	Waterville
	College of the Atlantic	Bar Harbor
	Eastern Maine Vocational and Technical Institute	Bangor
	Maine Maritime Academy	Castine
	Masson College	Springvale
	South Maine Vocational and Technical Institute	South Portland
	Unity College	Unity
	University of Maine at Orono	Orono
MD	Bowie State College	Bowie
	Catonsville Community College	Catonsville
	Charles County Community College	La Plata
	Chesapeake College	Wye Mills
	Columbia Union College	Takoma Park
	Community College of Baltimore	Baltimore
	Dundalk Community College	Baltimore
	Essex Community College	Baltimore County
	Garrett Community College	McHenry
	Goucher College	Towson
	Hagerstown Junior College	Hagerstown
	Harford Community College	Bel Air
	Hood College	Frederick
	Howard Community College	Columbia
	Johns Hopkins University	Baltimore
	Loyola College	Baltimore
	Montgomery College	Rockville
	Saint John's College	Annapolis
	Saint Mary's College of Maryland	Saint Mary's City
	Towson State College	Baltimore
	University of Baltimore	Baltimore
	University of Maryland	College Park
	Villa Julie College	Stevenson
	Washington College	Chestertown

APPENDIX V
CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
MA	Amherst College	Amherst
	Anna Maria College	Paxton
	Assumption College	Worcester
	Bay Path Junior College	Longmeadow
	Bentley College	Waltham
	Boston College	Chestnut Hill
	Boston University	Boston
	Gordon College	Wenham
	Hampshire College	Amherst
	Harvard University	Cambridge
	Lasell Junior College	Auburndale
	Lesley College	Cambridge
	Massachusetts Institute of Technology	Cambridge
	Merrimack College	North Andover
	Mount Holyoke College	South Hadley
	Nichols College	Dudley
	Northeastern University	Boston
	Regis College	Weston
	Simon's Rock	Great Barrington
	Smith College	Northampton
	Southeastern Massachusetts University	North Darmouth
	Springfield College	Springfield
	Springfield Technical Community College	Springfield
	Stonehill College	North Easton
	Suffolk University	Boston
	Tufts University	Medford
	University of Massachusetts	Boston
	Wentworth Institute	Boston
	Wheelock College	Boston
	Williams College	Williamstown
	Worcester Junior College	Worcester
	Worcester Polytechnic Institute	Worcester
MI	Alma College	Alma
	Alpena Community College	Alpena
	Andrews University	Berrien Springs
	Aquinas College	Grand Rapids
	Bay de Noc Community College	Escanaba
	Calvin College	Grand Rapids
	Calvin Theological Seminary	Grand Rapids
	Central Michigan University	Mount Pleasant
	Concordia Lutheran Junior College	Ann Arbor
	Delta College	University Center
	Detroit Institute of Technology	Detroit
	Eastern Michigan University	Ypsilanti
	Ferris State College	Big Rapids
	General Motors Institute	Flint
	Grace Bible College	Wyoming
	Grand Rapids Baptist College	Grand Rapids
	Grand Rapids Junior College	Grand Rapids
	Grand Valley State College	Allendale
	Highland Park Community College	Highland Park
	Hillsdale College	Hillsdale
	Hope College	Holland

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Jackson Community College	Jackson
	Kalamazoo College	Kalamazoo
	Kalamazoo Valley Community College	Kalamazoo
	Kirtland Community College	Roscommon
	Lake Michigan College	Benton Harbor
	Lake Superior State College	Saulte Ste. Marie
	Lansing Community College	Lansing
	Macomb County Community College	Warren
	Madonna College	Livonia
	Marygrove College	Detroit
	Mercy College of Detroit	Detroit
	Merrill-Palmer Institute	Detroit
	Michigan Department of Education-Environmental Guidelines	Lansing
	Michigan State University	East Lansing
	Michigan Technological University	Houghton
	Mid Michigan Community College	Harrison
	Monroe County Community College	Monroe
	Montcalm Community College	Sidney
	Mott Community College	Flint
	Muskegon Business College	Muskegon
	Muskegon Community College	Muskegon
	Northern Michigan University	Marquette
	Northwestern Michigan College	Traverse City
	Oakland Community College	Bloomfield Hills
	Oakland University	Rochester
	Olivet College	Olivet
	Saginaw Valley State College	University Center
	Saint Mary's College	Orchard Lake
	Schoolcraft College	Livonia
	Shaw College at Detroit	Detroit
	Southwestern Michigan College	Dowagiac
	Spring Arbor College	Spring Arbor
	Suomi College	Hancock
	University of Detroit	Detroit
	University of Michigan	Ann Arbor
	Walsh College	Troy
	Washtenaw Community College	Ann Arbor
	Wayne County Community College	Detroit
	Wayne State University	Detroit
	Western Michigan University	Kalamazoo
	West Shore Community College	Scottville
	Western Theological Seminary	Holland
MN	Anoka-Ramsey Community College	Coon Rapids
	Augsburg College	Minneapolis
	Austin Community College	Austin
	Bemidji State University	Bemidji
	Bethany Lutheran College	Mankato
	Brainerd Community College	Brainerd
	Carleton College	Northfield
	College of Saint Benedict	St. Joseph
	College of St. Catherine	St. Paul
	College of St. Scholastica	Duluth
	College of St. Thomas	St. Paul
	Concordia College	Moorhead
	Crosier Seminary Junior College	Onamia
	Dr. Martin Luther College	New Ulm
	Fergus Falls Community College	Fergus Falls
	Hibbing Community College	Hibbing
	Itasca Community College	Grand Rapids
	Lakewood Community College	White Bear Lake
	Luther Theological Seminary	St. Paul
	Macalester College	St. Paul
	Mankato State University	Mankato

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Mesabi Community College	Virginia
	Metropolitan Community College	Minneapolis
	Metropolitan State University	St. Paul
	Minneapolis College of Art and Design	Minneapolis
	Minnesota Bible College	Rochester
	Moorhead State College	Moorhead
	Normandale Community College	Bloomington
	North Hennepin Community College	Minneapolis
	Northland Community College	Thief River Falls
	Northwestern College	Roseville
	Rainy River Community College	International Falls
	Rochester Community College	Rochester
	Saint John's University	Collegeville
	Saint Mary's College	Winona
	Southwest Minnesota State College	Marshall
	St. Cloud Area Vocational Technical Institute	St. Cloud
	St. Cloud State University	St. Cloud
	St. Mary's Junior College	Minneapolis
	St. Paul Bible College	Bible College
	United Theological Seminary of the Twin Cities	New Brighton
	University of Minnesota	Minneapolis
	Vermilion Community College	Ely
	William Mitchell College of Law	St. Paul
	Winona State University	Winona
	Worthington Community College	Worthington
MS	Alcorn State University	Lorman
	Belhaven College	Jackson
	Clarke College	Newton
	Coahama Junior College	Clarksdale
	Copiah-Lincoln Junior College	Wesson
	Delta State University	Cleveland
	East Central Junior College	Decatur
	East Mississippi Junior College	Scooba
	Hinds Junior College	Raymond
	Holmes Junior College	Goodman
	Itawamba Junior College	Fulton
	Jackson State University	Jackson
	John C. Stennis Vocational Complex	Dekalb
	Jones County Junior College	Ellisville
	Mary Holmes College	West Point
	Meridian Junior College	Meridian
	Millsaps College	Jackson
	Mississippi College	Clinton
	Mississippi Delta Junior College	Moorhead
	Mississippi Gulf Coast Junior College	Perkinston
	Mississippi Industrial College	Holly Springs
	Mississippi State University	Mississippi State
	Mississippi University for Women	Columbus
	Northeast Mississippi Junior College	Booneville
	Northwest Mississippi Junior College	Senatobia
	Pearl River Junior College	Poplarville
	Rust College	Holly Springs
	Southwest Mississippi Junior College	Summit
	Tougaloo College	Tougaloo
	University of Mississippi	University
	University of Mississippi Medical Center	Jackson
	University of Southern Mississippi	Hattiesburg
	Utica Junior College	Utica
	Wesley College	Florence
	William Carey College	Hattiesburg
	Wood Junior College	Mathiston

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
MO	Assemblies of God Graduate School	Springfield
	Avila College	Kansas City
	Calvary Bible College	Kansas City
	Central Bible College	Springfield
	Central Methodist College	Fayette
	Central Missouri State University	Warrensburg
	Columbia College	Columbia
	Concordia Seminary	St. Louis
	Cottey College	Nevada
	Crowder College	Neosho
	Culver-Stockton College	Canton
	Fontbonne College	St. Louis
	Hannibal Lagrange College	Hannibal
	Harris Teachers College	St. Louis
	Jefferson College	Hillsboro
	Kansas City Art Institute	Kansas City
	Kansas City College of Osteopathic Medicine	Kansas City
	Logan College of Chiropractic	Chesterfield
	Longview Community College	Kansas City
	Maple Woods Community College	Kansas City
	Maryville College	St. Louis
	Meramec Community College	St. Louis
	Missouri Baptist College	St. Louis
	Missouri Southern State College	Joplin
	Moberly Area Junior College	Moberly
	Northeast Missouri State University	Kirksville
	Northwest Missouri State University	Maryville
	Rockhurst College	Kansas City
	Saint Louis College of Pharmacy	St. Louis
	Saint Louis Community College at Forest Park	St. Louis
	Saint Louis University	St. Louis
	Saint Paul's College	Concordia
	School of the Ozarks	Point Lookout
	Southwest Missouri State University	Springfield
	State Fair Community College	Sedalia
	Stephen's College	Columbia
	Tarkio College	Tarkio
	The Principia	St. Louis
	Three Rivers Community College	Poplar Bluff
	University of Missouri-Columbia	Columbia
	University of Missouri-Kansas City	Kansas City
	University of Missouri-Rolla	Rolla
	University of Missouri-St. Louis	St. Louis
	Washington University	St. Louis
	Water and Wastewater Technical School	Neosho
	Webster College	Webster
	Westminster College	Fulton
	William Jewell College	Kansas City
MT	Carroll College	Helena
	College of Great Falls	Great Falls
	Dawson College	Glendive
	Eastern Montana College	Billings
	Flathead Valley Community College	Kalispell
	Miles Community College	Miles City
	Montana College of Mineral Science and Technology	Butte
	Montana State University	Bozeman
	Northern Montana College	Havre
	Rocky Mountain College	Billings
	University of Montana	Missoula
	Western Montana College	Dillon

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
NE	Central Technical Community College	Hastings
	Chadron State College	Chadron
	College of Saint Mary	Omaha
	Concordia College	Seward
	Creighton University	Omaha
	Dana College	Blair
	Doane College	Crete
	Grace College of the Bible	Omaha
	Hastings College	Hastings
	Kearney State College	Kearney
	McCook Community College	McCook
	Midland Lutheran College	Fremont
	Mid-Plains Community College	North Platte
	Northeast Technical Community College	Norfolk
	Platte Technical Community College	Columbus
	Southeast Community College	Lincoln
	Union College	Lincoln
	University of Mid-America	Lincoln
	University of Nebraska	Lincoln
	Wayne State College	Wayne
NV	University of Nevada-Las Vegas	Las Vegas
	University of Nevada-Reno	Reno
	Clark County Community College	Las Vegas
	Northern Nevada Community College	Elko
	Sierra Nevada College	Incline Village
	Western Nevada Community College	Carson City
NH	Colby-Sawyer College	New London
	Dartmouth College	Hanover
	Franklin Pierce College	Rindge
	New England College	Henniker
	NH Technical Institute	Concord
	NH Voc-Tech College of Berlin	Berlin
	NH Voc-Tech College of Claremont	Claremont
	NH Voc-Tech College of Laconia	Laconia
	NH Voc-Tech College of Manchester	Manchester
	NH Voc-Tech College of Nashua	Nashua
	NH Voc-Tech College of Portsmouth	Portsmouth
	Saint Anselm's College	Manchester
	University of New Hampshire	Durham
	White Pines College	Chester
NJ	Atlantic Community College	Mays Landing
	Bergen Community College	Paramus
	Brookdale Community College	Lincroft
	Burlington County College	Penberton
	Camden County College	Caldwell
	Centenary College for Women	Hackettstown
	County College of Morris	Dover
	Cumberland County College	Vineland
	Drew University	Madison
	Fairleigh Dickinson University	Rutherford
	Gloucester County College	Sewell
	Kean College of New Jersey	Union
	Mercer County Community College	Trenton
	Middlesex County College	Edison
	Montclair State College	Upper Montclair
	New Jersey Institute of Technology	Newark
	Ocean County College	Toms River
	Passaic County Community College	Paterson
	Princeton University	Princeton

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Rider College	Trenton
	Rutgers the State University	New Brunswick
	Stevens Institute of Technology	Hoboken
	Trenton State College	Trenton
	Union College	Cranford
	Union County Technical Institute	Scotch Plains
	William Paterson College	Wayne
NM	College of the Southwest	Hobbs
	Eastern New Mexico University-Main Campus	Portales
	Eastern New Mexico University-Roswell	Roswell
	New Mexico Highlands University	Las Vegas
	New Mexico Institute of Mining and Technology	Socorro
	New Mexico Junior College	Hobbs
	New Mexico Military Institute	Roswell
	New Mexico State University-Las Cruces	Las Cruces
	New Mexico State University-San Juan	San Juan
	University of Albuquerque	Albuquerque
	University of New Mexico-Main Campus	Albuquerque
NY	Adelphi University	Garden City
	Albany College Pharmacy	Albany
	Albany Law School	Albany
	Alfred University	Alfred
	Bard College	Annandale-on-Hudson
	Bronx Community College	Bronx
	Brooklyn Law School	Brooklyn
	Canisius	Buffalo
	City University of New York	New York
	Clarkson College of Technology	Potsdam
	Colgate University	Hamilton
	College of Mt. Saint Vincent	Riverdale
	College of Saint Rose	Albany
	Columbia University	New York
	Concordia College	Bronxfille
	Cornell University	Ithaca
	Dowling College	Oakdale Long Island
	D'Youville College	Buffalo
	Erie Community College	Buffalo
	Hamilton College	Clinton
	Hartwick College	Oneonta
	Hilbert College	Hamburg
	Hobart-William Smith Colleges	Geneva
	Hofstra University	Hempstead
	Houghton College	Houghton
	Hudson Valley Community College	Troy
	Hunter College	New York
	Ithaca College	Ithaca
	King's College	Briarcliff Manor
	Long Island University	Greenvale
	Manhattan College	Bronx
	Medaille College	Buffalo
	Mercy College	Dobbs Ferry
	Molloy College	Rockville Centre
	New School for Social Research	New York
	New York Institute of Technology	Old Westbury
	New York Law School	New York
	Niagara University	Niagara University

APPENDIX V
CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Paul Smith's College of Arts & Science	Paul Smiths
	Polytechnic Institute of New York	Brooklyn
	Rensselaer Polytechnic Institute	Troy
	Roberts Wesleyan College	Rochester
	Rochester Institute of Technology	Rochester
	Rockefeller University	New York
	Saint Banaventure University	Saint Bonaventure
	Saint John Fisher College	Rochester
	Saint John's University	Jamaica
	Saint Lawrence University	Canton
	Saint Thomas Aquinas College	Sparkhill
	Skidmore College	Saratoga Springs
	Southampton College	Southampton
	State University of New York at Buffalo	Buffalo
	Syracuse University	Syracuse
	The Cooper Union	New York
	Trocaire College	Buffalo
	Ulster County Community College	Stone Ridge
	University of Rochester	Rochester
	Vassar College	Poughkeepsie
	Wagner College	Staten Island
	Webb Institute of Naval Architecture	Glen Cove
	Westchester Community College	Valhalla
NC	Anson Technical Institute	Ansonville
	Appalachian State University	Boone
	Asheville Buncombe Technical Institute	Asheville
	Atlantic Christian College	Wilson
	Beaufort County Technical Institute	Washington
	Belmont Abbey College	Belmont
	Bennett College	Greensboro
	Bladen Technical Institute	Dublin
	Blue Ridge Technical Institute	Flat Rock
	Brevard College	Brevard
	Campbell College	Buies Creek
	Cape Fear Technical Institute	Wilmington
	Carteret Technical Institute	Morehead City
	Catawba College	Salisbury
	Catawba Valley Technical Institute	Hickory
	Central Carolina Technical Institute	Sanford
	Central Piedmont Community College	Charlotte
	Chowan College	Murfreesboro
	Cleveland County Technical Institute	Shelby
	Coastal Carolina Community College	Jacksonville
	College of the Albemarle	Elizabeth City
	Craven Community College	New Bern
	Davidson College	Davidson
	Davidson County Community College	Lexington
	Duke University	Durham
	Durham College	Durham
	East Carolina University	Greenville
	Elon College	Elon College
	Fayetteville State University	Fayetteville
	Fayetteville Technical Institute	Fayetteville
	Gardner Webb College	Boiling Springs
	Gaston College	Dallas
	Greensboro College	Greensboro
	Guilford College	Greensboro
	Guilford Technical Institute	Jamestown
	Halifax Community College	Weldon
	Haywood Technical Institute	Clyde
	High Point College	High Point
	Isothermal Community College	Spindale
	James Sprunt Institute	Kenansville
	Johnson C. Smith University	Charlotte

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Johnston Technical Institute	Smithfield
	Lees-McCrae College	Banner Elk
	Lenoir Community College	Kinston
	Lenoir-Rhyne College	Hickory
	Livingstone College	Salisbury
	Louisburg College	Louisburg
	Mars Hill College	Mars Hill
	Martin Community College	Williamston
	Mayland Technical Institute	Spruce Pine
	McDowell Technical Institute	Marion
	Meredith College	Raleigh
	Methodist College	Fayetteville
	Montreat-Anderson College	Montreat
	Mount Olive College	Mount Olive
	Nash Technical Institute	Rocky Mount
	North Carolina Agricultural and Technical State University	Greensboro
	North Carolina Central University	Durham
	North Carolina State University	Raleigh
	North Carolina Wesleyan College	Rocky Mount
	Pembroke State University	Pembroke
	Pfeiffer College	Misenheimer
	Piedmont Bible College	Winston-Salem
	Piedmont Technical Institute	Roxboro
	Pitt Technical Institute	Greenville
	Queens College	Charlotte
	Randolph Technical Institute	Asheboro
	Richmond Technical Institute	Hamlet
	Roanoke-Chowan Technical Institute	Ahoskie
	Robeson Technical Institute	Lumberton
	Rockingham Community College	Wentworth
	Rowan Technical Institute	Salisbury
	Saint Andrews Presbyterian College	Laurinburg
	Saint Augustine's College	Raleigh
	Saint Mary's College	Raleigh
	Salem College	Winston-Salem
	Sampson Technical Institute	Clinton
	Sandhills Community College	Carthage
	Shaw University	Raleigh
	Stanly Technical Institute	Albemarle
	Surry Community College	Dobson
	Technical Institute of Alamance	Burlington
	Tri-County Technical Institute	Murphy
	University of North Carolina at Chapel Hill	Chapel Hill
	University of North Carolina at Charlotte	Charlotte
	University of North Carolina at Greensboro	Greensboro
	University of North Carolina at Wilmington	Wilmington
	Wake Forest University	Winston-Salem
	Wake Technical Institute	Raleigh
	Warren Wilson College	Swannanoa
	Wayne Community College	Goldsboro
	Western Carolina University	Cullowhee
	Western Piedmont Community College	Morganton
	Wilkes Community College	Wilkesboro
	Wilson County Technical Institute	Wilson
	Wingate College	Wingate
	Winston-Salem State University	Winston-Salem

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
ND	Bismarck Junior College	Bismarck
	Dickinson State College	Dickinson
	Jamestown College	Jamestown
	Lake Region Junior College	Devils Lake
	Mary College	Bismarck
	Mayville State College	Mayville
	Minot State College	Minot
	North Dakota State School of Science	Wahpeton
	North Dakota State University-Main Campus	Fargo
	North Dakota State University-Bottineau	Bottineau
	Trinity Bible Institute	Ellendale
	University of North Dakota-Main Campus	Grand Forks
	University of North Dakota-Williston	Williston
OH	Antioch College	Yellow Springs
	Art Academy of Cincinnati	Cincinnati
	Bluffton College	Bluffton
	Capital University	Columbus
	Case Western Reserve University	Cleveland
	Central Ohio Technical College	Newark
	Central State University	Wilberforce
	Cincinnati Bible College	Cincinnati
	Cincinnati Technical College	Cincinnati
	Clark Technical College	Springfield
	Cleveland Institute of Art	Cleveland
	Cleveland Institute of Music	Cleveland
	Cleveland State University	Cleveland
	College of Mount St. Joseph on the Ohio	Cincinnati
	College of Steubenville	Steubenville
	College of Wooster	Wooster
	Columbus College of Art and Design	Columbus
	Columbus Technical Institute	Columbus
	Cuyahoga Community College	Cleveland
	Davis Junior College	Toledo
	Defiance College	Defiance
	Denison University	Granville
	Franklin University	Columbus
	Hebrew Union College	Cincinnati
	Heidelberg College	Tiffin
	Hiram College	Hiram
	Hocking Technical College	Nelsonville
	Jefferson County Technical Institute	Steubenville
	John Carroll University	Cleveland
	Josephinum College of Liberal Arts	Worthington
	Kent State University	Kent
	Kenyon College	Gambier
	Kettering College of Medical Arts	Kettering
	Lakeland Community College	Mentor
	Lima Technical College	Lima
	Lorain County Community College	Elyria
	Lutheran Theological Seminary	Columbus
	Malone College	Canton
	Marietta College	Marietta
	Marion Technical College	Marion
	Medical College of Ohio	Toledo
	Miami-Jacobs Junior College	Dayton
	Miami University	Oxford
	Mount Union College	Alliance
	Mount Vernon Nazarene College	Mount Vernon
	Muskingum Area Technical College	Zanesville
	Muskingum College	New Concord
	National Training and Operational Technology Center (EPA)	Cincinnati
	North Central Technical College	Mansfield

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Northwest Technical College	Archbold
	Notre Dame College	Cleveland
	Oberlin College	Oberlin
	Ohio Board of Regents-Technical Education Offerings	Columbus
	Ohio Dominican College	Columbus
	Ohio Northern University	Ada
	Ohio State University	Columbus
	Ohio University	Athens
	Ohio Wesleyan University	Delaware
	Owens Technical College	Perrysburg
	Saint John College of Cleveland	Cleveland
	Sinclair Community College	Dayton
	Stark Technical College	Canton
	Tiffin University	Tiffin
	United Theological Seminary	Dayton
	University of Cincinnati	Cincinnati
	University of Dayton	Dayton
	University of Toledo	Toledo
	Urbana College	Urbana
	Washington Technical College	Marietta
	Wittenberg University	Springfield
	Wright State University	Dayton
	Xavier University	Cincinnati
	Youngstown State University	Youngstown
OK	Bacone College	Muskogee
	Bartlesville Weslyan College	Bartlesville
	Bethany Nazarene College	Bethany
	Cameron University	Lawton
	Carl Albert Junior College	Poteau
	Central State University	Edmond
	Claremore Junior College	Claremore
	Connors State College	Warner
	East Central Oklahoma State University	Ada
	Eastern Oklahoma State College	Wilburton
	El Reno Junior College	El Reno
	Hillsdale Free Will Baptist College	Moore
	Midwest Christian College	Oklahoma City
	Murray State College	Tishomingo
	Northeastern Oklahoma Agricultural and Mechanical College	Miami
	Northeastern Oklahoma State University	Tahlequah
	Northern Oklahoma College	Tonkawa
	Northwesterm Oklahoma State University	Alva
	Oklahoma Baptist University	Shawnee
	Oklahoma Christian College	Oklahoma City
	Oklahoma City University	Oklahoma City
	Oklahoma Panhandle State University	Goodwell
	Oklahoma School of Business, Accountancy, Law and Finance	Tulsa
	Oklahoma State University-Main Campus	Stillwater
	Oklahoma State University-Oklahoma City	Oklahoma City
	Oral Roberts University	Tulsa
	Oscar Rose Junior College	Midwest City
	Phillips University	Enid
	Saint Gregory's College	Shawnee
	Sayre Junior College	Sayre
	Seminole Junior College	Seminole
	Southeastern Oklahoma State University	Durant
	South Oklahoma City Junior College	Oklahoma City
	Southwestern College	Oklahoma City
	Tulsa Junior College	Tulsa
	University of Oklahoma-Central Office	Norman

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	University of Oklahoma-Health Science Center	Oklahoma City
	University of Science and Arts of Oklahoma	Chickasha
	University of Tulsa	Tulsa
	Western Oklahoma State College	Altus
OR	Blue Mountain Community College	Pendleton
	Chemeketa Community College	Salem
	Clackamas Community College	Oregon City
	Clatsop Community College	Astoria
	Columbia Christian College	Portland
	Concordia College	Portland
	George Fox College	Newberg
	Judson Baptist College	Portland
	Lane Community College	Eugene
	Lewis and Clark College	Portland
	Linfield College	McMinnville
	Linn-Benton Community College	Albany
	Marylhurst Education Center	Marylhurst
	Mount Hood Community College	Gresham
	Multnomah School of the Bible	Portland
	Museum Art School	Portland
	Oregon State Higher Education District	
	Eastern Oregon State College	La Grande
	Oregon College of Education	Monmouth
	Oregon Institute of Technology	Klamath Falls
	Oregon State University	Corvallis
	Portland State University	Portland
	Southern Oregon State College	Ashland
	University of Oregon-Health Sciences Center	Portland
	Pacific University	Forest Grove
	Reed College	Portland
	Southwestern Oregon Community College	Coos Bay
	Treasure Valley Community College	Ontario
	Umpqua Community College	Rosenburg
	University of Portland	Portland
	Warner Pacific College	Portland
	Western Baptist Bible College	Salem
	Western Conservative Baptist Seminary	Portland
	Western Evangelical Seminary	Portland
	Williamette University	Salem
PA	Allegheny College	Meadville
	Allentown College of St. Francis De Sales	Center Valley
	Alliance College	Cambridge Springs
	Beaver College	Glenside
	Bloomsburg State College	Bloomsburg
	Bucks County Community College	Newton
	Butler County Community College	Butler
	Cabrini College	Radnor
	California State College	California
	Carlow College	Pittsburgh
	Carnegie-Mellon University	Pittsburgh
	Cedar Crest College	Allentown
	Chestnut Hill College	Philadelphia
	Cheyney State College	Cheyney
	Clarion State College	Clarion
	Community College of Allegheny County	Pittsburgh
	Community College of Beaver County	Monaca
	Community College of Philadelphia	Philadelphia
	Delaware Valley College of Science and Agriculture	Doylestown

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Dickinson College	Carlisle
	Drexel University	Philadelphia
	The Dropsie University	Philadelphia
	Duquesne University	Pittsburgh
	Eastern College	Saint Davids
	East Stroudsburg State College	East Stroudsburg
	Edinboro State College	Edinboro
	Franklin-Marshall College	Lancaster
	Gannon College	Erie
	Geneva College	Beaver Falls
	Gettysburg College	Gettysburg
	Gwynedd-Mercy College	Gwynedd Valley
	Harcum Junior College	Bryn Mawr
	Haverford College	Haverford
	Indiana University of Pennsylvania	Indiana
	Juniata College	Huntingdon
	Keystone Junior College	La Plume
	King's College	Wilkes-Barre
	Lafayette College	Easton
	La Roche College	Allison Park
	La Salle College	Philadelphia
	Lehigh University	Bethlehem
	Lincoln University	Lincoln University
	Lock Haven State College	Lock Haven
	Lycoming College	Williamsport
	Mansfield State College	Mansfield
	Marywood College	Scranton
	Mercyhurst College	Erie
	Millersville State College	Millersville
	Montgomery County Community College	Blue Bell
	Northeastern Christian Junior College	Villanova
	Pennsylvania State University	University Park
	Philadelphia College of Pharmacy and Science	Philadelphia
	Point Park College	Pittsburgh
	Reading Area Community College	Reading
	Saint Fidelis College	Herman
	Saint Francis College	Loretto
	Saint Joseph's College	Philadelphia
	Saint Vincent College	Latrobe
	Seton Hill College	Greensburg
	Slippery Rock State College	Slippery Rock
	Spring Garden College	Chestnut Hill
	Susquehanna University	Selinsgrove
	Swarthmore College	Swarthmore
	Temple University	Philadelphia
	University of Pennsylvania	Philadelphia
	University of Pittsburg	Pittsburgh
	University of Scranton	Scranton
	Ursinus College	Collegeville
	Villa Maria College	Erie
	Villanova University	Villanova
	Waynesburg College	Waynesburg
	West Chester State College	West Chester
	Westminster College	New Wilmington
	Widener College	Chester
	Wilkes College	Wilkes-Barre
	Williamsport Area Community College	Williamsport
	Wilson College	Chambersburg
PR	Inter American University of Puerto Rico	San German
	The Catholic University of Puerto Rico	Ponce
	University of Puerto Rico	Mayaguez
	University of Puerto Rico	Rio Pedras

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
RI	Brown University	Providence
	Providence College	Providence
	Roger Williams College	Bristol
	University of Rhode Island	Kingston
SC	Aiken Technical Education Center	Aiken
	Baptist College	Charleston
	Bob Jones University	Greenville
	Central Wesleyan College	Central
	Citadel Military College of South Carolina	Charleston
	Claflin College	Orangeburg
	Clemson University	Clemson
	Coastal Carolina College	Conway
	Coker College	Hartsville
	College of Charleston	Charleston
	Columbia College	Columbia
	Columbia Bible College	Columbia
	Converse College	Spartanburg
	Erskine College	Due West
	Florence-Darlington Technical College	Florence
	Francis Marion College	Florence
	Furman University	Greenville
	Greenville Technical College	Greenville
	Lander College	Greenwood
	Limestone College	Gaffney
	Morris College	Sumter
	Newberry College	Newberry
	North Greenville College	Tigerville
	Orangeburg-Calhoun Technical College	Orangeburg
	Piedmont Technical College	Greenwood
	South Carolina State College	Orangeburg
	Sumter Area Technical College	Sumter
	Tri County Technical College	Pendleton
	Trident Technical College	North Charleston
	University of South Carolina	Columbia
	University of South Carolina at Aiken	Aiken
	University of South Carolina at Beaufort	Beaufort
	University of South Carolina at Spartanburg	Spartanburg
	University of South Carolina at Union	Union
	Voorhees College	Denmark
	Winthrop College	Rock Hill
	Wofford College	Spartanburg
SD	Augustana College	Sioux Falls
	Black Hills State College	Spearfish
	Dakota Wesleyan University	Mitchell
	Freeman Junior College	Freeman
	National College of Business	Rapid City
	Northern State College	Aberdeen
	Presentation College	Aberdeen
	Sioux Falls College	Sioux Falls
	South Dakota School of Mines and Technology	Rapid City
	South Dakota State University	Brookings
	University of South Dakota-Springfield	Springfield
TN	Aquinas Junior College	Nashville
	Austin Peay State University	Clarksville
	Belmont College	Nashville
	Carson-Newman College	Jefferson City
	Chattanooga State Technical Community College	Chattanooga

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Christian Brothers College	Memphis
	Cleveland State Community College	Cleveland
	Columbia State Community College	Columbia
	Covenant College	Lookout Mountain
	Cumberland College	Lebanon
	David Lipscomb College	Nashville
	Dyersburg State Community College	Dyersburg
	East Tennessee State University	Johnson City
	Fisk University	Nashville
	Freed-Hardeman College	Henderson
	Free Will Baptist Bible College	Nashville
	George Peabody College for Teachers	Nashville
	Hiwassee College	Madisonville
	Jackson State Community College	Jackson
	King College	Bristol
	Knoxville College	Knoxville
	Lambuth College	Jackson
	LeMoyne-Owen College	Memphis
	Martin College	Pulaski
	Memphis State University	Memphis
	Middle Tennessee State University	Murfreesboro
	Milligan College	Milligan College
	Nashville State Technical Institute	Nashville
	Roane State Community College	Harriman
	Shelby State Community College	Memphis
	State Technical Institute at Memphis	Memphis
	Steed College	Johnson City
	Tennessee Technological University	Cookeville
	Tennessee Wesleyan College	Athens
	University of the South	Sewanee
	University of Tennessee	Knoxville
	University of Tennessee Center for Health Sciences	Memphis
	University of Tennessee at Martin	Martin
	University of Tennessee at Nashville	Nashville
	Vanderbilt University	Nashville
	Volunteer State Community College	Gallatin
	Walters State Community College	Morristown
TX	Abilene Christian University	Abilene
	Alvin Community College	Alvin
	Amarillo College	Amarillo
	American Technological University	Killeen
	Angelina College	Lufkin
	Angelo State University	San Angelo
	Austin College	Sherman
	Austin Presbyterian Technological Seminary	Austin
	Baylor College of Dentistry	Dallas
	Baylor College of Medicine	Houston
	Baylor University	Waco
	Bee County College	Beeville
	Blinn College	Brenham
	Brazosport College	Lake Jackson
	Cisco Junior College	Cisco
	Clarendon College	Clarendon
	College of the Mainland	Texas City
	Concordia Lutheran College	Austin
	Cooke County College	Gainesville
	Dallas Bible College	Dallas
	Dallas Christian College	Dallas
	Dallas County Community College District	
	Eastfield College	Mesquite
	El Centro College	Dallas
	Mountain View College	Dallas
	Richland College	Dallas

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Dallas Theological Seminary	Dallas
	Del Mar College	Corpus Christi
	DeVry Institute of Technology	Dallas
	East Texas Baptist College	Marshall
	East Texas State University	Commerce
	El Paso Community College	El Paso
	Frank Phillips College	Borger
	Galveston College	Galveston
	Grayson College	Denison
	Gulf Coast Bible College	Houston
	Hardin-Simmons University	Abilene
	Henderson County Junior College	Athens
	Houston Baptist University	Houston
	Houston Community College	Houston
	Howard College at Big Spring	Big Spring
	Howard Payne University	Brownwood
	Huston-Tillotson College	Austin
	Incarnate Word College	San Antonio
	Jacksonville College	Jacksonville
	Jarvis Christian College	Hawkins
	Kilgore College	Kilgore
	Lamar University	Beaumont
	Laredo Junior College	Laredo
	Lee College	Baytown
	Le Tourneau College	Longview
	Lon Morris College	Jacksonville
	Lubbock Christian College	Lubbock
	McLennan Community College	Waco
	McMurry College	Abilene
	Midland College	Midland
	Midwestern State University	Wichita Falls
	Navarro College	Corsicana
	North Harris County College	Houston
	North Texas State University	Denton
	Odessa College	Odessa
	Our Lady of the Lake University of San Antonio	San Antonio
	Pan American University	Edinburg
	Panola Junior College	Carthage
	Ranger Junior College	Ranger
	Rice University	Houston
	Saint Edward's University	Austin
	Sam Houston State University	Huntsville
	San Antonio College	San Antonio
	San Jacinto College	Pasadena
	Schreiner College	Kerrville
	Southern Bible College	Houston
	Southern Methodist University	Dallas
	South Plains College	Levelland
	South Texas College of Law	Houston
	Southwestern Assemblies of God College	Waxahachie
	Southwestern Baptist Theological Seminary	Fort Worth
	Southwestern Christian College	Terrell
	Southwestern Union College	Keene
	Southwestern University	Georgetown
	Southwest Texas State University	San Marcos
	Stephen F. Austin State University	Nacogdoches
	Tarleton State University	Stephenville
	Tarrant County Junior College-Northeast Campus	Hurst
	Tarrant County Junior College-Northwest Campus	Fort Worth
	Tarrant County Junior College-South Campus	Fort Worth
	Texarkana College	Texarkana
	Texas A & I University	Kingsville

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Texas A & I University-Corpus Christi	Corpus Christi
	Texas A & I University-Laredo	Laredo
	Texas A & M University-Main Campus	College Station
	Texas A & M University Moody College of Marine Sciences and Maritime Resources	Galveston
	Texas Christian University	Fort Worth
	Texas College	Tyler
	Texas Lutheran College	Seguin
	Texas Southmost College	Brownsville
	Texas State Technical Institute-James Connally Campus	Waco
	Texas State Technical Institute-Mid-Continent Campus	Amarillo
	Texas State Technical Institute-Rio Grande Campus	Harlingen
	Texas Tech University	Lubbock
	Texas Wesleyan College	Fort Worth
	Texas Woman's University	Denton
	Trinity University	San Antonio
	Tyler Junior College	Tyler
	University of Dallas	Irving
	University of Houston-Main Campus	Houston
	University of Houston-Clear Lake City	Houston
	University of Houston-Victoria Campus	Victoria
	University of Texas-Arlington	Arlington
	University of Texas-Austin	Austin
	University of Texas at Dallas	Richardson
	University of Texas-El Paso	El Paso
	University of Texas Health Science Center at Dallas	Dallas
	University of Texas Health Science Center at Houston	Houston
	University of Texas Medical Branch at Galveston	Galveston
	University of Texas-San Antonio	San Antonio
	Vernon Regional Junior College	Vernon
	Victoria College	Victoria
	Weatherford College	Weatherford
	Western Texas College	Snyder
	West Texas State Universtiy	Canyon
	Wharton County Junior College	Wharton
	Wiley College	Marshall
UT	Brigham Young University	Provo
	Stevens Henager College	Ogden
	University of Utah	Salt Lake City
	Utah Higher Education System Office	
	University of Utah	Salt Lake City
	Utah State University	Logan
	Southern Utah State College	Cedar City
	Weber State College	Ogden
	College of Eastern Utah	Price
	Dixie College	Saint George
	Snow College	Ephraim
	Utah Technical College at Salt Lake City	Salt Lake City
	Westminster College	Salt Lake City

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
VT	Champlain College	Burlington
	Johnson State College	Johnson
	Lyndon State College	Lyndonville
	Marlboro College	Marlboro
	Middlebury College	Middlebury
	Norwich University	Northfield
	Saint Michael's College	Winooski
	School for International Training	Brattleboro
	Southern Vermont College	Bennington
	Trinity College	Burlington
	University of Vermont and State Agriculture College	Burlington
	Vermont Institute of Community Involvement	South Burlington
	Vermont Technical College	Randolph Center
	Windham College	Putney
VA	Averett College	Danville
	Bridgewater College	Bridgewater
	College of William and Mary	Williamsburg
	Eastern Mennonite College	Harrisonburg
	Eastern Virginia Medical School	Norfolk
	Emory and Henry College	Emory
	Ferrum College	Ferrum
	Hampton Institute	Hampton
	Institute of Textile Technology	Charlottesville
	J. Sargeant Reynolds Community College	Richmond
	Madison University	Harrisonburg
	Old Dominion University	Norfolk
	Radford College	Radford
	Randolph-Macon College	Ashland
	Randolph-Macon Woman's College	Lynchburg
	Saint Paul's College	Lawrenceville
	University of Virginia	Charlottesville
	Virginia Intermont College	Bristol
	Virginia Military Institute	Lexington
	Virginia Polytechnic Institute and State University	Blacksburg
	Virginia Wesleyan College	Norfolk
	Washington and Lee University	Lexington
	Wytheville Community College	Wytheville
WA	Bellevue Community College	Bellevue
	Big Bend Community College	Moses Lake
	Centralia College	Centralia
	Central Washington State College	Ellensburg
	Clark College	Vancouver
	Columbia Basin Community College	Pasco
	Cornish School of Allied Arts	Seattle
	Eastern Washington State College	Cheney
	Evergreen State College	Olympia
	Fort Steilacoom Community College	Tacoma
	Fort Wright College of the Holy Names	Spokane
	Gonzaga University	Spokane
	Grays Harbor College	Aberdeen
	Green River Community College	Auburn
	Highline Community College	Midway
	Lower Columbia College	Longview
	Lutheran Bible Institute of Seattle	Seattle
	Northwest College of the Assemblies of God	Kirkland
	Olympia Technical Community College	Olympia
	Olympic College	Bremerton
	Pacific Lutheran University	Tacoma
	Peninsula College	Port Angeles

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Seattle Community College District	
	North Seattle Community College	Seattle
	Seattle Community College-Central Campus	Seattle
	Seattle Community College-South Campus	Seattle
	Seattle University	Seattle
	Shoreline Community College	Seattle
	Skagit Valley College	Mount Vernon
	Tacoma Community College	Tacoma
	University of Puget Sound	Tacoma
	Walla Walla College	College Place
	Walla Walla Community College	Walla Walla
	Washington State Community College-District 5	
	Edmonds Community College	Lynnwood
	Everett Community College	Everett
	Washington State Community College-District 17	
	Spokane Falls Community College	Spokane
	Washington State University	Pullman
	Wenatchee Valley College	Wenatchee
	Western Washington State College	Bellingham
	Whatcom Community College	Bellingham
	Whitman College	Walla Walla
	Whitworth College	Spokane
	Yakima Valley College	Yakima
WV	Alderson Broaddus College	Phillippi
	Beckley College	Beckley
	Bethany College	Bethany
	Bluefield State College	Bluefield
	Concord College	Athens
	Davis and Elkins College	Elkins
	Glenville State College	Glenville
	Marshall University	Huntington
	Morris Harvey College	Charleston
	Parkersburg Community College	Parkersburg
	Potomac State College	Keyser
	Salem College	Salem
	West Liberty State College	West Liberty
	West Virginia Institute of Technology	Montgomery
	West Virginia University	Morgantown
	Wheeling College	Wheeling
WI	Alverno College	Milwaukee
	Beloit College	Beloit
	Blackhawk Technical Institute	Janesville
	Cardinal Stritch College	Milwaukee
	Carroll College	Waukesha
	Carthage College	Kenosha
	Concordia College	Milwaukee
	District One Technical Institute	Eau Claire
	Edgewood College	Madison
	Fox Valley Technical Institute	Appleton
	Gateway Technical Institute	Kenosha
	Holy Redeemer College	Waterford
	Institute of Paper Chemistry	Appleton
	Lakeshore Technical Institute	Cleveland
	Lawrence University	Appleton
	Madison Area Technical College	Madison
	Madison Business College	Madison
	Marian College of Fond Du Lac	Fond Du Lac
	Marquette University	Milwaukee
	Mid-State Technical Institute	Wisconsin Rapids
	Milton College	Milton

APPENDIX V

CATALOGS REVIEWED

STATE	INSTITUTION	LOCATION
	Milwaukee Area Technical College	Milwaukee
	Moraine Park Vocational, Technical and Adult Education Institute	Fond Du Lac
	Mount Mary College	Milwaukee
	Mount Senario College	Ladysmith
	Nicolet College and Technical Institute	Rhinelander
	North Central Technical Institute	Wausau
	Northeast Wisconsin Technical Institute	Green Bay
	Northland College	Ashland
	Ripon College	Ripon
	Saint Norbert College	De Pere
	Silver Lake College	Manitowoc
	Southwest Wisconsin Vocational-Technical Institute	Fennimore
	University of Wisconsin-Green Bay	Green Bay
	University of Wisconsin-Madison	Madison
	University of Wisconsin-Milwaukee	Milwaukee
	University of Wisconsin-System Office	Madison
	Viterbo College	La Crosse
	Waukesha County Technical Institute	Pewaukee
	Western Wisconsin Technical Institute	La Crosse
WY	Casper College	Casper
	Eastern Wyoming College	Torrington
	Laramie County Community College	Cheyenne
	Northwest Community College	Powell
	Sheridan College	Sheridan
	University of Wyoming	Laramie
	Western Wyoming Community College	Rock Springs